SOUTH AFRICAN CUMACEA

PART 1
FAMILY BODOTRIIDAE, SUBFAMILY VAUNTHOMPSONIINAE

By

JENNIFER DAY

Zoology Department, University of Cape Town

(With 15 figures and 1 table)

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CONTENTS

INTRODUCTION

This is the first in a series of papers on the Cumacea of southern Africa (south of 20°S). The families best represented in these waters are the Bodotriidae and Diastylidae. There are relatively few Leuconidae, Lampropidae and Nannastacidae, while the Pseudocumatidae are numerous, but confined almost exclusively to estuaries, where there are perhaps two species. There are also further specimens of the Ceratocumatidae to be described in a later paper in the series.

Studies on the cumacean fauna of southern African waters are scanty. Stebbing published two papers (1910, 1912) on material sent to him by the South African Museum, mainly describing specimens collected during the voyages of the s.s. *Pieter Faure* from 1898 to 1907. Zimmer (1908) included several South African species in his descriptions of the Deutsches Tiefsee-Expedition material,

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and later (1921) described a few in the collection of the Zoologisches Museum, Berlin. Since then, Fage (1951) and Jones (1956) have described a few species from this region in the collections of the Belgian Oceanographic Expedition and Atlantide series respectively, and Hale (1953) and Jones (1960) have published on some of the material in the collection of the University of Cape Town. Otherwise, the cumacean fauna of the region is poorly known.

MATERIAL

Some of the more interesting specimens were kindly loaned by Dr Brian Kensley of the South African Museum (SAM)—largely material obtained by the s.s. *Pieter Faure*, which is old and therefore frequently decalcified and damaged. Two specimens of *Vaunthompsonia natalensis* were sent to me by Mr Tim McClurg from the Natal Benthic Survey being carried out by the National Institute for Water Research (NIWR) of the Council for Scientific and Industrial Research (CSIR). The vast majority of specimens, however, was obtained by the Zoology Department of the University of Cape Town (UCT) during an extensive benthic survey of inshore waters from Lüderitzbucht in South West Africa to Inhambane in Moçambique, the cruises being funded by the Oceanographic Research Unit of the CSIR. I am particularly grateful for access to this material.

STATION DATA

The UCT material is numbered according to the area from which it was obtained: WCD (West Coast Dredge) from the border of South West Africa to Cape Agulhas, LBT from the Lambert's Bay Transect, FAL from False Bay, SCD (South Coast Dredge) from Cape Agulhas to the southern border of Natal, NAD (Natal Dredge) from Natal waters, and PED (Portuguese East Dredge) from Moçambique (Fig. 1). 'Coast' indicates material from the NIWR survey, and 'SAM', South African Museum material. The depths and positions of all SAM (*Pieter Faure*) stations have been approximated from charts, since the station data are sketchy, and many depths are not given, or are inaccurate.

METHODS

All the SAM and NIWR material was obtained by dredging. In the UCT survey, heavy-duty dredges and Van Veen grabs of area 0,2 m^2 were used. Some of the LBT material was obtained using a scuba-diver-operated suction device (Christie & Allen 1972). The instrument is a cylinder sampling an area of 0,1 m^2 by 60 cm deep, which is lowered right into the substrate. Different fractions of substrate may then be collected, enabling analysis of fractions from different levels below the surface. The cumaceans were all obtained in the top 10 cm fraction.

Length measurements were in all cases taken from the most anterior point of the carapace to the posterior edge of the telsonic somite, the uropods being omitted from these measurements.

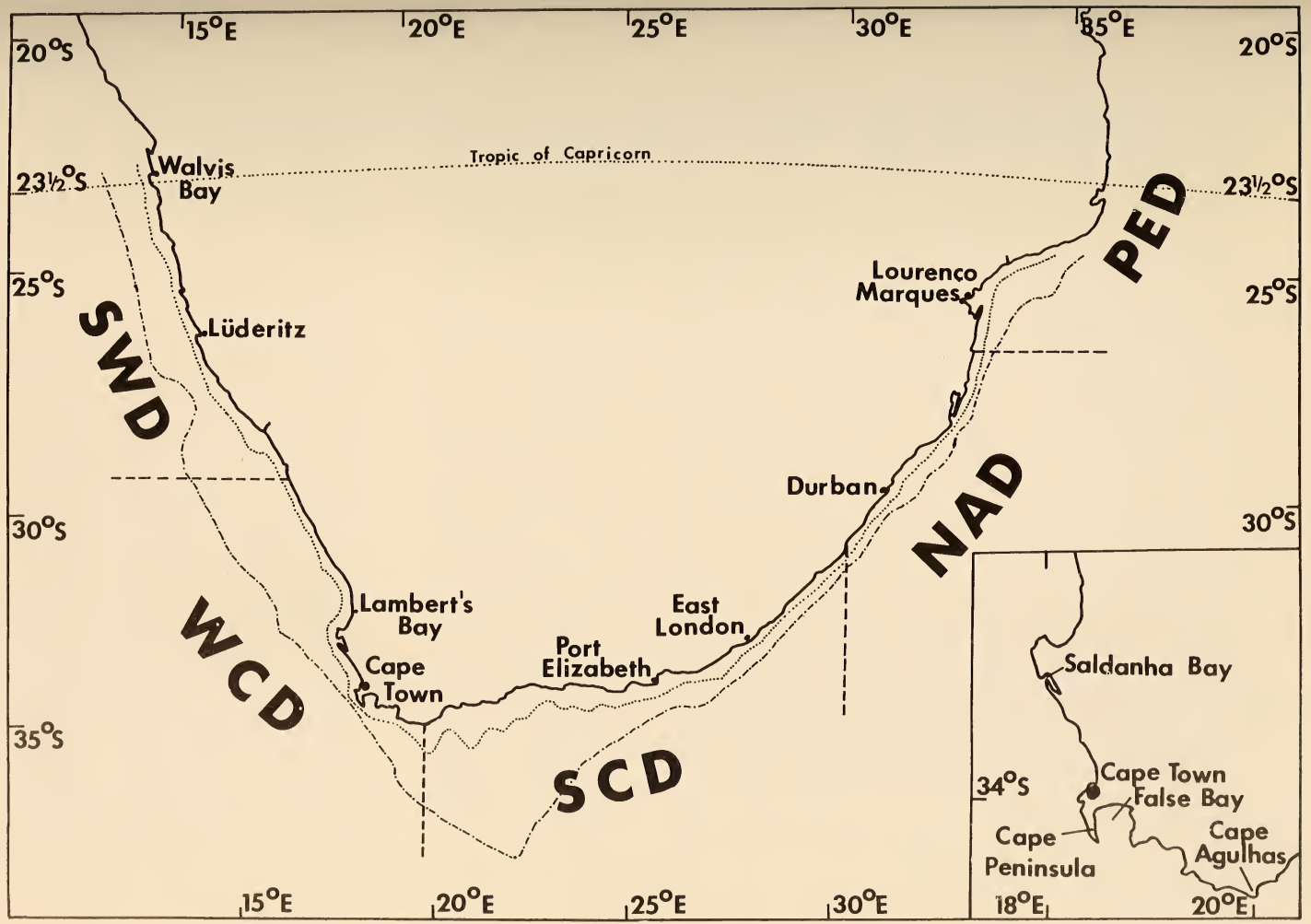

Fig. 1. Southern Africa south of 20°S: ..... 100 m depth contour; ._._._ 500 m depth contour.
Inset: south-western Cape.

STRUCTURE AND TERMINOLOGY

The terminology used by authors who are familiar with a group is frequently confusing to those who are dealing with it for the first time. Below is a brief account of the structure of the Cumacea, and the terminology used to describe it. For a fuller description, the reader is referred to Jones (1963), whose terminology is adopted in the present series, particularly in the use of the term 'somite' as a metameric segment of the body, and 'segment' as a podomere of the appendages.

The Cumacea are typical Malacostraca, having 19 body segments or *somites*, each of which may bear a pair of appendages. The *head* region consists of five somites, bearing from the anterior end two pairs of antennae, a pair of mandibles and two pairs of maxillae. There are eight *thoracic somites*, the anterior three bearing maxillipeds, and the posterior five (the *pedigerous somites*) bearing pereiopods. The *abdomen*, of six *pleon somites*, may have up to five pairs of pleopods in the male, and none in the female. The sixth abdominal somite bears a pair of uropods. A *telson* is present in some families, and in others it is fused with the last abdominal somite which is known as the *telsonic somite*.

A well-developed *carapace* is present, fused not only to all five head somites, but also to three, four, five or six thoracic somites. It is bowed laterally to cover the branchial chambers, and is produced anteriorly to form *pseudorostral lobes*, below which is the exhalent opening of the branchial chamber. The two lobes together are known as the *pseudorostrum*. Antero-laterally the carapace is frequently notched to accommodate the first antenna—the *antennal notch*—with a sharp point, the *antero-lateral angle*, below it. Dorsally, if visual elements are present, they are usually fused into a single median *eye*, frequently pigmented, with a variable number of lenses. The eye is situated on the *eyelobe*, a median projection of the carapace anteriorly between the pseudorostral lobes. The carapace may be quite smooth, but is often ornamented with tubercles, spines or other projections, or is sculptured into median and/or lateral keels or *carinae*. The free thoracic and abdominal somites may also be carinate.

APPENDAGES

Antenna 1 (antennule) consists of three basal segments bearing two flagella. The main *flagellum*, of up to six segments, carries a number of sensory filaments or *aesthetascs*, which are usually annulated. The *accessory flagellum* may have up to four segments, or may be wanting.

Antenna 2 is rudimentary in the female, but may reach the entire length of the body in the male, where it may be used for sensing the presence of the female, or for clasping her during copulation.

Mandibles are formed from a single segment, and are normally crescent-shaped.

Maxilla 1 (maxillule) is rudimentary, but may bear one or two epipodal filaments reaching into the branchial chamber.

Maxilla 2 (maxilla) is also rudimentary.

The *thoracic appendages* are typical stenopodous limbs. *Exopods*, some of which may be rudimentary, are always found consecutively on at least two of these limbs from maxilliped 3 to pereiopod 4 inclusive. The maximum number is five, and there are usually more in the male than the female. The exopods consist of a *basal segment*, sometimes expanded into a laminar plate, and a variable number of distal segments which usually carry long plumose setae. Well-developed exopods assist considerably in swimming. The *endopod* of a thoracic appendage is typically divided into seven *segments*. These are named (from the proximal end) the *coxa*, *basis*, *ischium*, *merus*, *carpus*, *propodus* and *dactyl*.

Maxilliped 1 normally consists of a seven-segmented endopod and an epipodite developed into a series of plates or lobes which function as the *gill*.

Maxilliped 2 is also normally seven-segmented. The coxa of ovigerous females is produced to form a *rudimentary oostegite*, bearing filaments which extend into the brood chamber and fan the developing embryos.

Maxilliped 3, always seven-segmented, usually bears a well-developed exopod. The outer distal portion of the basis is frequently expanded, and the basis forms a shield protecting the mid-ventral region of the thorax.

Pereiopod 1, always bearing an exopod, is seven-segmented, and is frequently elongated, reaching beyond the anterior end of the pseudorostral lobes.

Pereiopods 2 to 5 may or may not bear exopods, and are normally seven-segmented, although in some genera the ischium of pereiopod 2 is fused with the basis.

The male may bear up to five pairs of biramous *pleopods*. These may be rudimentary, but if fully developed consist of a basal segment, a 1-segmented *inner ramus* and a 2-segmented *outer ramus*. The distal ends of the rami are frequently supplied with a large number of plumose setae used in swimming.

The *uropods*, also biramous, consist of a 1-segmented *peduncle*, a 2-segmented *exopod* and an *endopod* which may consist of one, two or three segments. These appendages form the forked tail characteristic of all Cumacea.

SEXUAL DIMORPHISM

The Cumacea exhibit considerable sexual dimorphism. The sexual differences include small details such as the sculpturing and degree of armature of the exoskeleton, but most other more basic differences can be attributed to characters allowing greater swimming capacity in the male, and the presence of a *marsupium* or brood pouch in the female. Distinguishing male from female is important, since several characters of the males of some genera are the same as the female characters of another. Determination of sex is not always easy, especially in an immature animal, but the following may be helpful as a guideline:

The *adult male* has between zero and five pairs of pleopods, usually setiferous, and the second antennae extend a considerable distance along the body. Thoracic exopods are frequently flattened and expanded, the antero-lateral angle rounded or obliterated, and serrations of the carapace reduced or absent.

The *subadult male* has a full complement of pleopods, not yet setiferous, and the second antennae are still developing. Sculpturing of the exoskeleton is often midway between the condition of the adult male and the female.

The *ovigerous female* is distinguished by the presence of a *marsupium*. The coxae of maxilliped 3 and pereiopods 1 to 3 develop *oostegites*, forming a large ventral brood chamber in which the eggs are visible during the later stages of development.

The *adult female* differs from an ovigerous one only in the absence of a marsupium.

The *manca*, the larval stage at which the animals are released from the marsupium, is characterized by the absence of the last pair of pereiopods.

The *juveniles* may be recognized, apart from their small size, by the absence of sexual dimorphism.

The majority of *males* and *females* in most collections are intermediate between the fully adult and juvenile stages, and although some sexual differences are present, they are not always easily determined. For example, in many bodotriids, the lateral plates of the pedigerous somites differ even in young males and females. However, this type of character is variable, and must be determined anew for each genus or species. One distinguishing characteristic which holds true for many (but not all) genera is that the male tends to have more pereiopods bearing exopods than does the female.

SYSTEMATICS

The Cumacea, being a rather homogeneous group, have few characters which divide them obviously into families. Thus two main schemes have been used to separate them. The one, detailed by Stebbing in 1913, now has 27 families. The other more commonly adopted scheme has seven families. Although neither of these systems is ideal, the latter is less cumbersome and will be adopted in the present series of papers.

Family **Bodotriidae** Scott, 1901

Diagnosis

No free telson. Pleopods with an outer process to the inner ramus—usually five pairs, but may be two (*Mancocuma*) or three (*Leptocuma*). Mandibles normal (i.e. not broad at base). Endopod of uropod 1- or 2-segmented. Branchial apparatus without gill plates or supports.

The family was divided by Hale (1944) into two subfamilies, the Bodotriinae and Vaunthompsoniinae. The Bodotriinae are characterized by having exopods limited to the third maxillipeds and first pereiopods in both sexes. The South African representatives of the subfamily will be dealt with in the second paper of this series.

Subfamily **Vaunthompsoniinae** G. O. Sars, 1879

Diagnosis

Bodotriidae with exopods on pereiopods other than the first pair.

KEY TO THE SOUTH AFRICAN SPECIES OF VAUNTHOMPSONIINAE

It should be noted that this key will separate all species found to date in southern African waters, but will *not* necessarily distinguish them from species from other areas.

1 Exopods present on pereiopods 1 and 2 only (♂ and ♀)..... *Pseudosympodomma africanum* (Fig. 2)
– Exopods present on pereiopods 1 to 3 (♂ and ♀).....2

2 Exopods of pereiopods 2 and 3 rudimentary.....3
– Exopods of pereiopods 2 and 3 well-developed; ♂ with exopod on pereiopod 4.....5

3 Maxilliped 3 with basis not at all produced distally..*Cumopsis robusta* sp. nov. (Figs 5, 6)
– Maxilliped 3 with basis produced distally.....4

4 Pereiopods 2 and 3 with exopods 1-segmented.....*Heterocuma africanum africanum*
– Pereiopods 2 and 3 with exopods 2-segmented..... *Heterocuma africanum intermedium* (Figs 3, 4)

5 Maxilliped 3 with basis not at all produced distally.....6
– Maxilliped 3 with basis produced distally.....9

6 Eye absent; carpus of maxilliped 3 inserted half way along length of merus; merus expanded externally ..... *Hypocuma dentatum* sp. nov. (Figs 7, 8)
– Eye present; carpus of maxilliped 3 not expanded, and inserted at distal end of merus....7

7 Serrated middorsal carina present in ♀.....*Vaunthompsonia cristata*
– No middorsal carina present in female.....8

8 Merus of maxilliped 3 longer than carpus; first segment of exopod of uropod less than half length of first segment of endopod.....*Vaunthompsonia natalensis* sp. nov. (Figs 9, 10)
– Merus of maxilliped 3 shorter than carpus; first segment of exopod of uropod nearly as long as first segment of endopod.....*Vaunthompsonia* sp. (Fig. 11)

9 Carapace of ♂ and ♀ with middorsal serrations; telsonic somite produced between uropods for at least ⅓ its length 10
– Carapace of ♀ at least with no middorsal serrations; telsonic somite little produced between uropods.....*Bathycuma datum* sp. nov. (Fig. 15)

10 Peduncle of uropod longer than telsonic somite; antenna 1 of adult ♂ very large, with many setae ..... *Bathycuma natalense* (Figs 13, 14)
– Peduncle of uropod shorter than telsonic somite; antenna 1 of ♂ unmodified..... *Bathycuma capense* (Figs 12, 13)

Pseudosympodomma Kurian, 1954

Generic diagnosis

Eyelobe narrowly linguiform with a cluster of lenses anteriorly—more in male than female. Pseudorostral lobes extending anteriorly but not meeting in front of elongated eyelobe. All pedigerous somites exposed. Basis of maxilliped 3 distally produced. Pereiopods 1 and 2 with free exopods in both sexes; adult male sometimes with a small ridge in position of exopod of pereiopod 3. Male with five pairs of pleopods. Endopod of uropod 2-segmented.

Type species *P. indicum* Kurian, 1954, from India, 'in weeds, 0,2 fm'.

*Pseudosympodomma africanum** (Stebbing, 1912)
Fig. 2

Sympodomma africanus Stebbing, 1912: 138, pl. L.
non *Sympodomma africanum:* Hale, 1928: 40, figs 9–10; 1944: 284, fig. 30.

Records

SAM A4331,	*Pieter Faure* 10782:	29°49′S/31°08′E	85 m	1♀	10,9 mm	
SAM A597,	*Pieter Faure* 17643:	34°24′S/17°58′E	370 m	1♀ adult	15,7 mm	PARATYPE
SAM A598	*Pieter Faure* 17643:	34°24′S/17°58′E	370 m	1♂ subadult	15,7 mm	
PED 23 X	22.8.1964	26°00′S/33°05′E	135 m	1 manca	4,3 mm	

Note: In his description of *S. africanum*, Stebbing gave the depth as 805 m. In fact, if the distance of 12½ miles from Cape Natal (*Pieter Faure* log) is correct, then the depth can be no more than 400 m in any direction, according to present-day charts. The bearing also appears to be the reciprocal of the normal bearings in the log, as 'Cape Natal N 3/4 E 12½ miles' is practically in the surf zone.
Holotype designated by Stebbing (1912) as *Sympodomma africanus*, *Pieter Faure* 17643 (as above), subadult male, 18,0 mm. British Museum (Natural History).

Description

Adult female, length 15,7 mm, paratype. Broken in two, but otherwise undamaged.

Carapace faintly tubercular, nearly twice as long as deep; median carina with three very large, anteriorly-directed teeth on the anterior part (Fig. 2A). Eye present, lenses distinct—seven above and seven below (Figs 2B, 2C). Eyelobe elongated, pseudorostral lobes not meeting. Antennal notch fairly shallow, semicircular; antero-lateral angle almost rectangular. All pedigerous somites visible above. Sternite of fourth pedigerous somite with anteriorly-directed tooth. Carapace as long as free thoracic somites. Cephalothorax equal in length to first four abdominal somites. Pedigerous somites with faint lateral carinae; two pairs of lateral carinae along length of abdomen. Telsonic somite produced between uropods for nearly ⅓ its length.

Antenna 1 (Fig. 2D) geniculate between segments 1 and 2. First segment large, slightly expanded laterally, equal in length to next two segments. Flagellum 2-segmented with two terminal setae. Accessory flagellum 2-segmented, equal in length to first segment of flagellum.

Maxilliped 3 (Fig. 2E) with basis 2½ times length of remaining segments, widely expanded at distal end, with four spines along the outer edge and two apical ones. Inner edge with a row of small denticles along its length. Remaining segments almost equal in length, ischium slightly the longest. Merus expanded slightly externally and carpus internally. Exopod small, basal segment less than ⅓ length of basis.

*The words 'omma' (Gr.), an eye, and 'cuma' (Gr.), an embryo, are grammatically neuter, hence *Pseudosympodomma africanum*, *Bathycuma natalense*, etc.

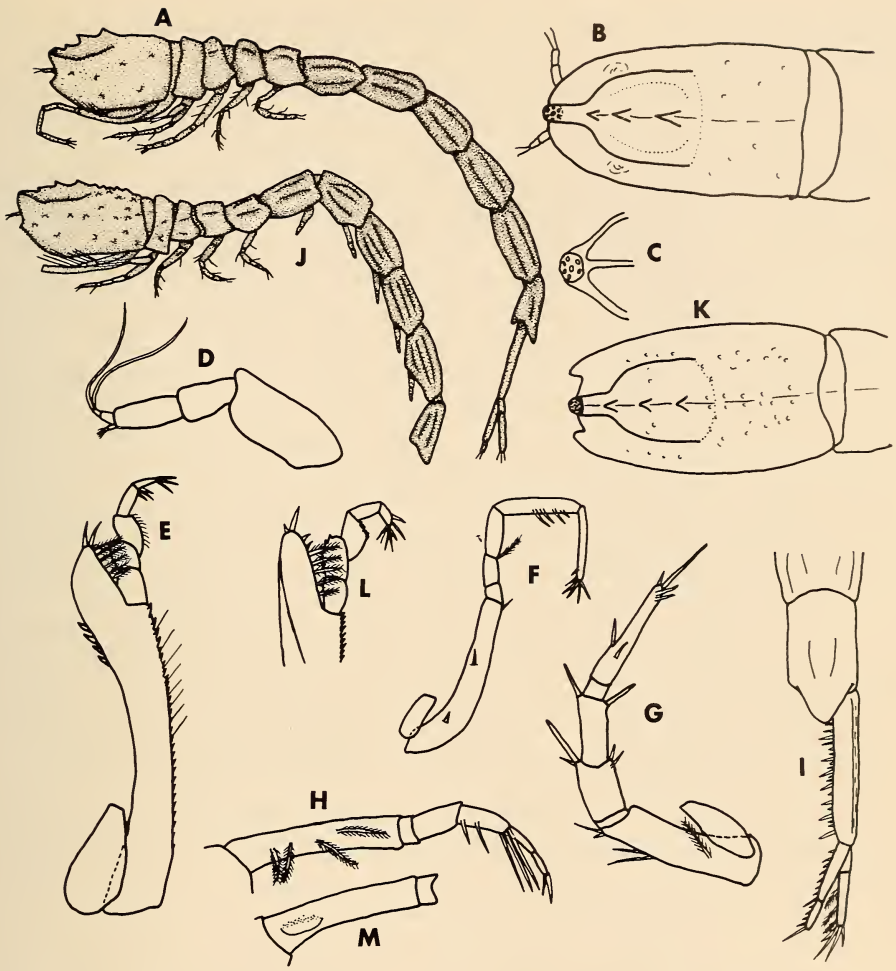

Fig. 2. *Pseudosympodomma africanum* (Stebbing, 1912)

Adult female, paratype, 15,7 mm: A, lateral view; B, dorsal view of carapace; C, ventral view of eyelobe; D, antenna 1; E, maxilliped 3; F, pereiopod 1; G, pereiopod 2; H, pereiopod 3; I, telsonic somite and uropod.

Subadult male, 15,7 mm: J, lateral view; K, dorsal view of carapace; L, distal portion of maxilliped 3; M, proximal segments of pereiopod 3.

Pereiopod 1 (Fig. 2F) fairly stout. Basis equal in length to next four segments. Ischium short. Propodus and dactyl long, subequal, each equal in length to merus plus carpus. Exopod small, basal segment not much more than a quarter length of basis.

Pereiopod 2 (Fig. 2G) stout. Basis equal in length to next four segments. Ischium $\frac{1}{3}$ as long as broad. Merus and carpus subequal. Dactyl equal to merus

plus carpus and bearing a number of scattered spines. Basal segment of exopod $\frac{2}{3}$ length of basis.

Pereiopod 3 (Fig. 2H) more slender. Basis equal in length to rest of leg. Ischium small, half as long as broad. Merus and carpus subequal. Carpus just longer than propodus, which is again slightly longer than dactyl. No exopod.

Peduncle of uropod (Fig. 2I) just longer than telsonic somite with 20 unequal spines along inner edge. Endopod slightly longer than exopod and about $\frac{2}{3}$ length of peduncle; first segment twice length of second, with eight small spines on inner margin, second with four, and one terminally. Exopod with first segment half the length of second, and unarmed. Second segment with three plumose setae on the inner margin and four terminal spines.

Subadult male, length 15,7 mm. In poor condition, uropods and parts of some thoracic appendages missing. As in the female, except as follows: teeth on middorsal carina less elevated, and followed by a row of uneven tubercles, the dorsal outline thus appearing uneven. Tubercles scattered over the rest of the carapace (Figs 2J, 2K). Antennal notch much shallower, antero-lateral angle less obvious. Ventral margin faintly dentate below the angle for about $\frac{1}{3}$ its length. Sternites of fourth and fifth pedigerous somites with an anteriorly-directed tooth in the midline. Abdominal somites with three pairs of carinae.

Distal prolongation of maxilliped 3 (Fig. 2L) narrower than in female, with four distal spines. Inner edge more spinous. Merus and carpus further expanded, these edges dentate.

Pereiopods as in female. Pereiopod 3 (Fig. 2M) without a free exopod, but with a slight swelling along the outer edge of the basis for about $\frac{1}{3}$ its length.

Five pairs of pleopods present.

Uropods missing. Telsonic somite of holotype male broader than that of female. Stebbing's figure of uropods of holotype as in female of present collection, but with greater armature.

Remarks

Stebbing (1912) described the species from a single subadult male, and the above specimens differ from his description only as follows: carapace of holotype less tubercular; distinct individual lenses present in eye of female, but eye of male as figured by Stebbing. Maxilliped 3 of holotype with merus and carpus slightly more expanded, with setae and not denticles along expanded edges. Stebbing figured the basal segment of antenna 1 as geniculate. The antennae of the holotype are missing, but in the present specimens the antenna is geniculate between the first and second segments.

In 1912 Stebbing erected a new family, the Sympodommatidae, with the single genus *Sympodomma* to receive four species—*Vaunthompsonia anomalum* (G. O. Sars, 1871), *Heterocuma weberi* Calman, 1905, *Heterocuma diomedaea* Calman, 1912 and a new species, *Sympodomma africanum*. The main distinguishing feature of the new family and genus was the presence of exopods on pereiopod 3 in both sexes. These were obviously present (according to descriptions in

the literature) in the first three species, but he says of *S. africanum* (one subadult male) that: 'exopods to the third pair were not satisfactorily made out, but may be presumed, as they occur in both sexes of the allied Japanese species.'

In addition to the holotype, I have examined four specimens which undoubtedly belong to Stebbing's *S. africanum*. One is a paratype, a subadult female, from the type locality with the same station data and museum number as the holotype. Another specimen, a subadult male from the same locality but with different station data, has a swelling in the expected position of the exopod of pereiopod 3, but this is fused to the basis along its entire length. Unfortunately the holotype now consists of little more than an empty carapace, three badly damaged and limbless thoracic somites and several abdominal somites, so that the pereiopods in question could not be examined. Neither of the females nor the manca had the slightest trace of an exopod on these limbs.

In 1954 Kurian erected a new genus, *Pseudosympodomma*, to receive a new Indian species, *P. indicum*, which has exopods on pereiopods 1 and 2 only in both sexes. He suggested that *Sympodomma africanum* might be referable to the new genus. Owing to the lack of an exopod on pereiopod 3 of the present specimens, Stebbing's *S. africanum* must now be referred to the genus *Pseudosympodomma*.

The two species of the genus may be distinguished as follows: the pseudorostral lobes and eyelobes of *P. indicum* are relatively longer than those of *P. africanum*. *P. indicum* has a 3-segmented accessory flagellum, while that of *P. africanum* is 2-segmented. In *P. indicum* the exopod of maxilliped 3 is less than a quarter the length of the basis; the prolongation of the basis is narrower and extends well beyond the merus. The last two segments of the first pereiopod are longer and more slender. The two segments of the endopod of the uropod are subequal, the two rami are of equal length, and the first segment of the exopod is only a quarter the length of the second. In the description of *P. indicum*, no mention is made of the teeth on the sternites of the pedigerous somites.

The two genera *Sympodomma* and *Pseudosympodomma* are very similar in general appearance, in distinctive features such as the large teeth or incisions on the dorsal carina, and the presence of teeth on the thoracic sternites of several species. Thus the genera are closely related, and the single feature distinguishing between them is the presence or absence of exopods on pereiopod 3. In the female this is quite clear, but in the male even this character is less distinctive due to the small protuberances on the bases of these legs. Thus the generic diagnosis of *Pseudosympodomma* has been expanded to accommodate *P. africanum*.

It should also be noted that Hale (1928, 1944, 1949) had some specimens which he considered to be *S. africanum*. Later, being unable to obtain more material, he erected a new species, *Sympodomma ?incerta* Hale, 1949. It is very similar to *P. africanum* in external appearance, but due to the presence of an obvious exopod on pereiopod 3 of the male, Hale's query may be removed, and the species becomes *Sympodomma incertum*.

Distribution of Pseudosympodomma

P. indicum is found in shallow Indian waters (Kurian 1954), and *P. africanum* from Natal to Cape Point at depths from 85 to 370 m. Thus the genus falls into the Indo-Pacific faunal group.

Heterocuma Miers, 1879

Generic diagnosis

Vaunthompsoniinae with the first pedigerous somite visible dorsally. Telsonic somite not produced. Eye present. Basis and merus of maxilliped 3 distally produced. Pereiopods 2 and 3 with rudimentary exopods in both sexes. Endopod of uropod 2-segmented. Male with five pairs of pleopods.
Type species *H. sarsi* Miers, 1879, from Korea and Japan.

KEY TO THE SPECIES OF *HETEROCUMA*

1 Pereiopods 2 and 3 with exopods 2-segmented..... *H. africanum intermedium* (Fage, 1924)—West and South Africa
– Pereiopods 2 and 3 with exopods 1-segmented.....2

2 Pleon segments carinate.....3
– Pleon segments not carinate.....4

3 First segment of endopod of uropod shorter than second..... *H. sarsi* Miers, 1879—Korea and Japan
– First segment of endopod of uropod longer than second..*H. andamani* Kurian,1954—India

4 Endopod of uropod distinctly shorter than peduncle..... *H. africanum africanum* Zimmer, 1921—India, West and South Africa
– Endopod of uropod just longer than peduncle.....*H. armatum* Kurian, 1954—India

Heterocuma africanum intermedium (Fage, 1924) n. comb.

Figs 3 (♀), 4 (♂)

Heterocuma intermedia Fage, 1924: 364, fig. 1.
Heterocuma africana: Jones, 1956: 194 (?pars); 1960: 172.

Records

WCD 99 R	32°05′S/18°17′E	2.7.1961	27 m	Sandy shell	1♂ adult	18,4 mm
SCD 151 C	34°55′S/21°26′E	21.2.1960	91 m	Sand	1♀ adult	19,1 mm
					1♀ ovig.	24,8 mm
SCD 293 F	33°04′S/27°57′E	6.2.1962	84 m	Sandy shell	1♀ ovig.	22,4 mm
FAL (False Bay)	34°S/18°E		15–77 m	Sandy shell	15 records:	
					2 adult ♂	18,2–18,4 mm;
					1 subadult ♂	19,3 mm;
					2♂	7,9–9,4 mm;
					3♀ ovig.	19,2–23,2 mm;
					8♀ adult	17,6–21,6 mm;
					5♀	7,4–11,0 mm;
					5 manca	4,0–5,8 mm (1 adult ♂, 1 ♀ ovig. and 2 ♀ adult identified by Jones 1960)

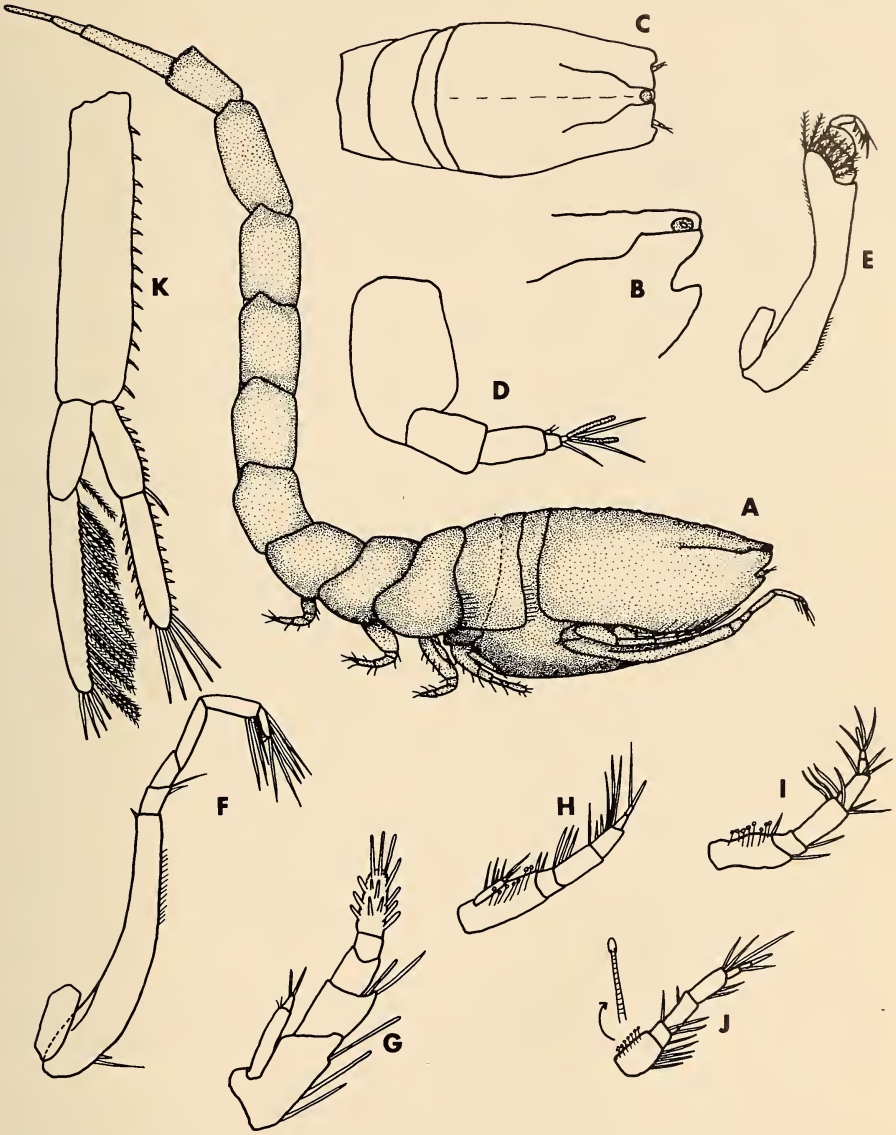

Fig. 3. *Heterocuma africanum intermedium* (Fage, 1924)
Ovigerous female, 23,2 mm: A, lateral view; B, detail of anterior end of carapace; C, dorsal view of carapace; D, antenna 1; E, maxilliped 3; F, pereiopod 1; G, pereiopod 2; H, pereiopod 3; I, pereiopod 4; J, pereiopod 5; K, uropod.

Holotype designated by Fage (1924) as *Heterocuma intermedia*; Museum National d'Histoire Naturelle, Paris.

Description

Ovigerous female, length 23,2 mm. Carapace twice as long as deep with a faint mid-dorsal carina. In lateral view (Fig. 3A), mid-dorsal line irregular and faintly arched posteriorly. Antennal notch deep, antero-lateral angle acute (Fig. 3B). Carapace just shorter than remaining free thoracic somites. Thorax and abdomen subequal. No lateral plates or carinae on abdomen. Eye present with single lens faintly visible on either side. Pseudorostral lobes not meeting anterior to eyelobe (Fig. 3C).

Antenna 1 (Fig. 3D) with basal segment very much expanded, being twice as long and twice as broad as second segment. Second and third segments subequal, second broader. Flagellum 2-segmented, first twice as long and as broad as second which carries a number of terminal setae and two aesthetascs. Accessory flagellum minute, 1-segmented.

Maxilliped 3 (Fig. 3E) with well-developed broad distal prolongation of the basis. Ischium normal, merus dilated externally and carpus internally. Propodus and dactyl subequal. Basal segment of exopod less than a quarter length of basis.

Basis of pereiopod 1 (Fig. 3F) a quarter as long again as rest of leg. Ischium and merus subequal, as are carpus and propodus. Dactyl half length of propodus. Basal segment of exopod about a quarter length of basis.

Pereiopod 2 (Fig. 3G) very stout—basis half as long as broad. Ischium fused with basis. Dactyl with a large number of spines. Exopod large, as long as the basis, with a small but obvious second segment.

Pereiopod 3 (Fig. 3H) more slender, with exopod half length of basis, and having a small second segment.

Pereiopods 4 and 5 (Figs 3I and 3J) without exopods. Third to fifth pereiopods all furnished with distinctive knobbed setae on the bases.

Peduncle of uropods (Fig. 3K) half as long again as telsonic somite, with one row of 14 small spines on the inner edge. Exopod equal in length to peduncle, with first segment half as long as second. First with a single plumose seta, second with about 20, and four short terminal spines. Endopod $\frac{4}{5}$ length of peduncle, first segment about $\frac{3}{4}$ length of second with nine small and one large terminal spines on the inner edge. Second segment with 9–10 small spines on inner and outer edges, and five terminal spines of equal length.

Note: a single female from False Bay has a particularly well-marked row of tubercles on the mid-dorsal line of the carapace, and carinae running down the length of the abdomen on either side of the mid-line. Otherwise it corresponds with the above description.

Adult male, length 18,4 mm. As the female, except as follows: carapace with much less deeply indented antennal notch, antero-lateral angle almost obsolete (Fig. 4B). Thorax equal in length to next five abdominal somites (Fig. 4A). As is typical for the family, the thoracic sideplates are well developed, that of the

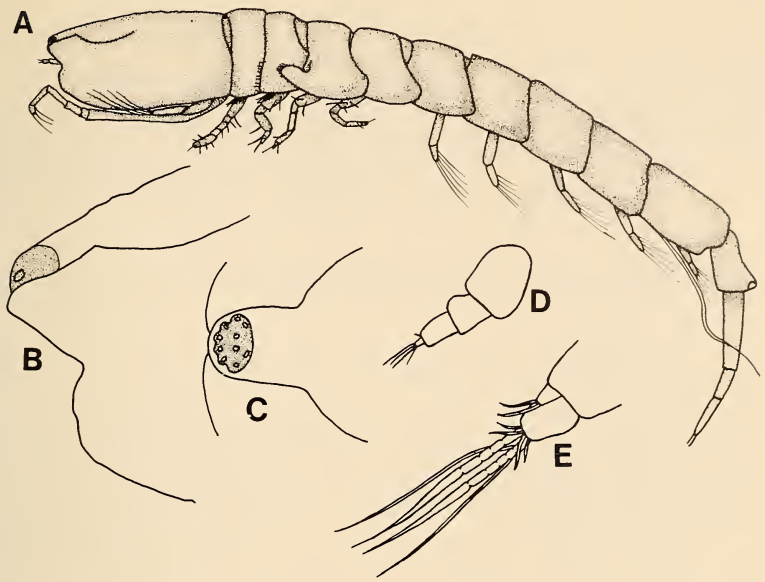

Fig. 4. *Heterocuma africanum intermedium* (Fage, 1924).
Adult male, 18,4 mm: A, lateral view; B, detail of anterior end of carapace; C, detail of eyelobe in dorsal view; D, antenna 1; E, distal segments of antenna 1.

fourth pedigerous somite having a prominent linguiform anterior projection. The armature of the peduncle of the uropods is more pronounced, having about 50 small, closely-packed spines in two rows along the inner edge. The single subadult male from the west coast differs from the adult males only in that the thoracic sideplates and uropodal armature are not fully developed, and the eye has 10 distinct lenses on the dorsal surface (Fig. 4C). Antenna 1 (Fig. 4D) is somewhat shorter in the male, and the flagellum is 1-segmented (Fig. 4E).

Distribution

Tropical West Africa (Fage 1924, 1950, 1951; Jones 1960—part); False Bay and south-west coast of South Africa (Jones 1960).

Heterocuma africanum africanum Zimmer, 1921

Heterocuma africana Zimmer, 1921: 129, figs 25–27. Kurian, 1954: 294, fig. 7.

Records

NAD 86 G	29°10′S/31°51′E	29.7.1964	43 m	Sand	2 ♀ adult 1 ♂	10,4–11,2 mm; 6,8 mm

Holotype designated by Zimmer, 1921 from West Africa, one subadult male. ?Zoologisches Museum, Berlin.

Description

The single sample from Natal is of interest in that although generally the specimens are very similar to *H. africanum intermedium*, they have short, 1-segmented exopods on pereiopods 2 and 3. The eyes of the single male and both females have lenses similar to those shown in Figure 4C. Although the females are adult, they are only about half the size of comparable specimens from False Bay. The carapace has no trace of a carina.

Distribution

Tropical West Africa (Zimmer 1921; Jones 1956—part); India (Kurian 1954); Natal.

Remarks

Heterocuma africanum was described but poorly figured by Zimmer (1921) from an immature specimen collected together with many juveniles from Freetown in Sierra Leone. Fage (1924) described *H. intermedium* from Rio do Oro, from Goreé (1950) and from Darsen and Annobon Islands (1951). Jones (1956) examined many specimens from the coast of West Africa, and equated Fage's *H. intermedium* with *H. africanum* due to the fact that Zimmer obviously described the latter from an immature specimen. More recently, Jones (1960) identified several specimens (now in the present collection) from False Bay and Dassen Island as *H. africanum*. These are indicated in the records above. Undoubtedly the two forms are very similar in most respects, but they are in fact distinguishable by the nature of the exopods of the second and third pereiopods. In Zimmer's specimen, they were 'in the form of short cylinders', while Fage (1924) specifically mentions 'the greater size and the division into two articles of the exopods of the second and third pereiopods'. Kurian (1954) identified two adult specimens (7–8 mm) as *H. africanum*, and both of these are figured as having short, 1-segmented exopods. The majority of the South African specimens have larger, 2-segmented exopods, while the exopods of those from Natal are smaller and 1-segmented. Jones (1956, 1960) mentioned the differences in size of some of the West African specimens, and the fact that those from South Africa are very large, but did not describe the exopods. In fact there is correlation between the size of the animals and the nature of the exopods. Those with 1-segmented exopods are smaller—Zimmer's largest was 4 mm, Kurian's 7–8 mm, and the Natal specimens reach 11,2 mm. Those with the bigger 2-segmented exopods are also larger in size—Fage's 16 mm, and the largest of the present specimens nearly 25 mm. The fact that 1-segmented exopods are present in adult animals from both India and Natal shows that this is not an age-dependent character, and it is therefore suggested that there are two distinct forms, insufficiently different to warrant specific rank. Those of Zimmer and Kurian, together with the NAD specimens are therefore designated *H. africanum africanum*, as opposed to those of Fage and Jones, and the majority of the specimens in the present collection, which become *H. africanum intermedium*.

Note: the size differences of the specimens identified by Jones (1956) in West Africa suggest that both forms may occur there.

Distribution of Heterocuma

H. sarsi, *H. armatum* and *H. andamani* are all shallow-water Indian Ocean or Indo-Pacific species. The two subspecies of *H. africanum* extend the range to the tropical Atlantic region.

Cumopsis G. O. Sars, 1878

Generic diagnosis

Vaunthompsoniinae with rudimentary exopods on pereiopods 2 and 3 in both sexes. Antenna 1 of male with a brush of sensory setae at base of flagellum. Basis of maxilliped produced distally very slightly or not at all, carpus not widened. Male with five pairs of pleopods. Telsonic somite truncate posteriorly, and not produced between the uropods. Endopod of uropod 2-segmented.
Type species *C. longipes* (A. Dohrn, 1869) as *Cuma longipes* from British Isles and Mediterranean.

KEY TO THE SPECIES OF *CUMOPSIS*

1 Dorso-lateral folds present 2
– Dorso-lateral folds absent 3

2 Two distinct lateral folds; carapace flattened dorsally ..... *C. goodsiri* (Van Beneden, 1861)—Europe, Indo-Pacific
– A single lateral fold; carapace convex dorsally ..... *C. wafri* Jones, 1956—West Africa

3 Thoracic sideplates well defined dorsally ..... *C. elongata* Jones, 1956—West Africa
– Thoracic sideplates not defined dorsally 4

4 Peduncle of uropod twice length of rami 5
– Peduncle of uropod only slightly longer than rami ..... *C. robusta* sp. nov.

5 First segment of exopod of uropod longer than second ..... *C. fagei* Băcescu, 1956—W. France, Morocco
– First segment of exopod of uropod shorter than second ..... *C. longipes* (A. Dohrn, 1869)—Britain and Mediterranean

Cumopsis robusta sp. nov.

Figs 5 (♀), 6 (♂)

Records

LBT 5H	15.9.1970	32°04′S/18°18′E	3 m	Sand	1 ♀ ovig.	3,7 mm	HOLOTYPE
LBT 8L	15.9.1970	32°04′S/18°18′E	5 m	Sand	1 ♂ adult	4,0 mm	
LBT 105F	30.1.1972	32°04′S/18°18′E	LWS	Sand	5 ♀ ovig.	3,7–4,8 mm	
LBT 144A	Sept. 1972	32°04′S/18°18′E	LWS	Sand	2 ♀ ovig.	3,7–4,2 mm	
LBT 146E	Sept. 1972	32°04′S/18°18′E	1 m	Sand	1 ♂ subadult	3,6 mm	
LBT 147G	Sept. 1972	32°04′S/18°18′E	1 m	Sand	1 ♀	3,5 mm	
CP 833A	May 1972	False Bay (34°S/18°E)		Sand	1 ♀ ovig.	4,4 mm	
					1 ♀	3,2 mm	

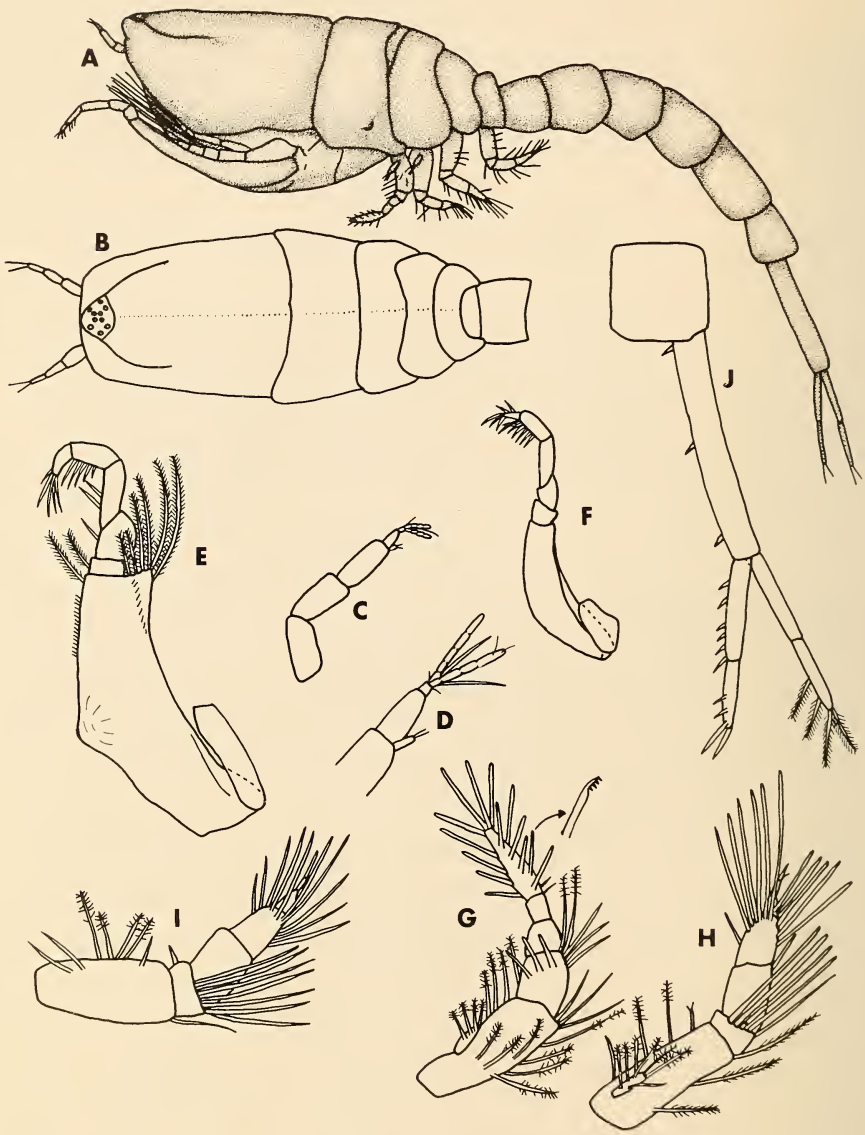

Fig. 5. *Cumopsis robusta* sp. nov.
Ovigerous female, holotype, 3,7 mm: A, lateral view; B, dorsal view of carapace; C, antenna 1; D, detail of distal end of antenna 1; E, maxilliped 3; F, pereiopod 1; G, pereiopod 2; H, pereiopod 3; I, pereiopod 4; J, telsonic somite and uropod.

Holotype

Ovigerous female, deposited in the South African Museum, number SAM A13433.

Description

Ovigerous female, holotype, length 3,7 mm. Integument lightly calcified, with faint reticulations at high magnifications. Carapace nearly twice as long as deep, and equal in length to remaining free thoracic somites (Fig. 5A). No trace of lateral folds. Carapace in dorsal view (Fig. 5B) almost rectangular anteriorly due to short unproduced pseudorostral lobes being interrupted by eyelobe. Eye elliptical with a number of dark red pigmented rings; lenses not discernable. Antennal notch hardly defined. Cephalothorax just longer than abdomen. Abdominal somites without sideplates. Telsonic somite plus uropods equal in length to the four preceding somites. Mouthparts and lower edge of carapace dark in fresh specimens.

Three basal segments of antenna 1 (Fig. 5C) subequal, slight flexure between first and second. Flagellum with two aesthetascs. Accessory flagellum small, 1-segmented (Fig. 5D).

Basis of maxilliped 3 (Fig. 5E) half as long again as rest of limb, distally truncate, and broadly widened at its midpoint. Ischium half as long as wide. Merus slightly flared externally. Carpus and propodus subequal. Basal segment of exopod less than half length of basis.

Basis of pereiopod 1 (Fig. 5F) stout, just longer than remaining segments, of which carpus the longest. Basal segment of exopod $\frac{2}{5}$ length of basis, and slightly expanded at the mid-point.

Pereiopod 2 (Fig. 5G) stout. Ischium fused with basis. Carpus and propodus subequal. Dactyl equal in length to merus plus carpus, with many spines. Exopod 1-segmented, and about quarter length of basis, with four long plumose setae.

Pereiopod 3 (Fig. 5H) very stout. Basis equal in length to next four segments. Merus and carpus subequal. Exopod as in pereiopod 2.

Pereiopod 4 (Fig. 5I) stout, with many setae. No exopod.

Telsonic somite square in dorsal view (Fig. 5J), unarmed. Uropods equal in length to the four preceding somites. Peduncle just longer than rami, with three small spines on inner edge. First segment of endopod $1\frac{1}{2}$ times length of second, with six spines on inner edge; second segment with two spines on inner edge and two long terminal spines. Segments of exopod subequal, first unarmed, second with two plumose setae on inner edge and two long terminal ones.

Adult male, length 4,0 mm. Differs from female as follows: carapace $\frac{3}{4}$ as deep as long; cephalothorax equal in length to next five abdominal somites (Fig. 6A), which are more robust than in the female. Sideplates of pedigerous and abdominal somites defined ventrally, that of the fourth pedigerous somite being produced anteriorly. No antennal notch.

Antenna 1 (Figs 6B, 6C) very robust, with a brush of sensory setae surrounding the 2-segmented flagellum (Fig. 6D).

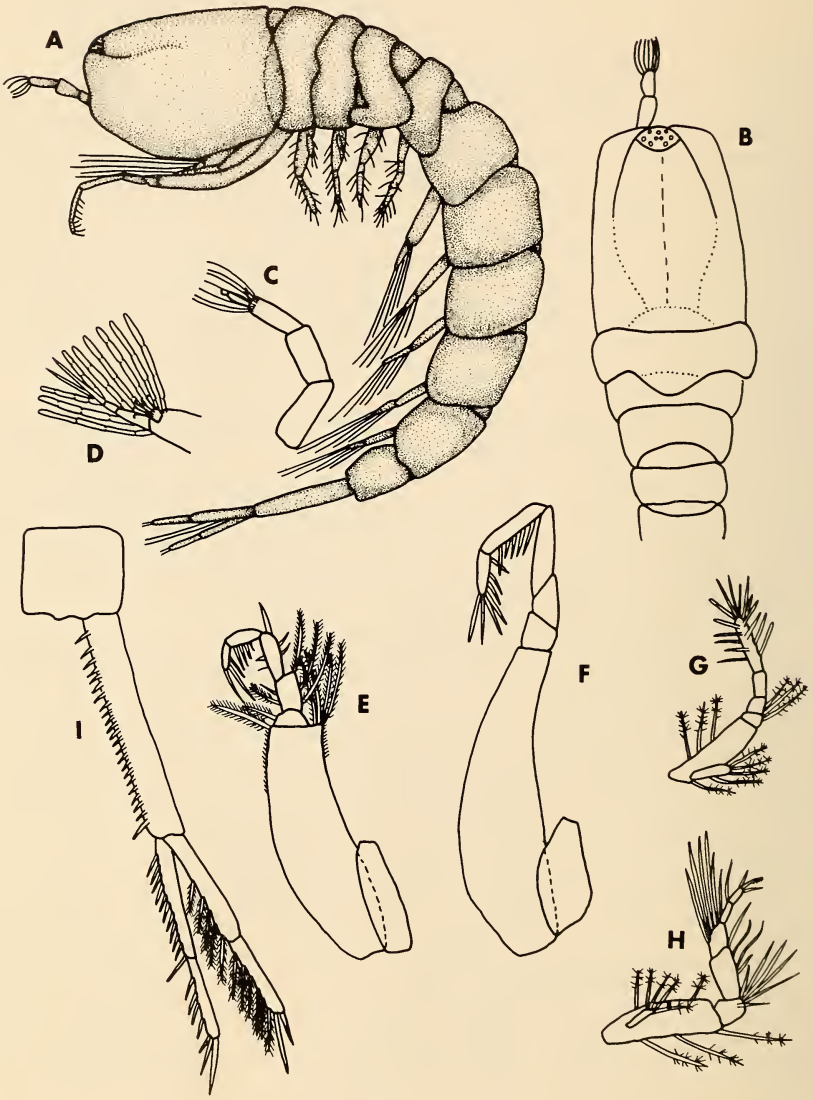

Fig. 6. *Cumopsis robusta* sp. nov.
Adult male, 4,0 mm: A, lateral view; B, dorsal view of carapace; C, antenna 1; D, detail of distal end of antenna 1; E, maxilliped 3; F, pereiopod 1; G, pereiopod 2; H, pereiopod 3; I, telsonic somite and uropod.

Antenna 2 extending just beyond uropods—segments short.

Maxilliped 3 (Fig. 6E) with merus slightly expanded externally; less robust than in female, and basis not angled.

Propodus of pereiopod 1 (Fig. 6F) relatively shorter.

Pereiopods 2 and 3 (Figs 6G and 6H) less stout. Merus and carpus of pereiopod 2 shorter than propodus. Basal segment of exopod nearly half length of basis.

Telsonic somite and uropods (Fig. 6I) equal in length to the three preceding somites. Inner border of peduncle armed with about 23 small spines. Armature of rami greater than in female.

Remarks

The species of *Cumopsis* are rather similar morphologically. *C. robusta* may be distinguished from *C. fagei*, which it closely resembles, as follows: in *C. fagei* the peduncle of the uropods is almost twice the length of the endopod, while in *C. robusta* the two are almost subequal. In dorsal view the eyelobe and pseudorostral lobes form a straight line anteriorly in *C. robusta* while in *C. fagei* the pseudorostral lobes extend beyond the eyelobe for a short distance. The peduncle of the uropod is relatively broader and the rami are subequal in *C. robusta*, while the exopod is the longer in *C. fagei*.

Distribution of Cumopsis

This genus is found almost exclusively intertidally or in the infratidal fringe. It occurs in the British Isles, through the Mediterranean, tropical West Africa and South Africa to Annam. *C. robusta* would appear to be endemic to the south-western coast of South Africa.

Hypocuma Jones, 1973

Generic diagnosis

Vaunthompsoniinae with pseudorostral lobes produced anteriorly to meet in front of the eyeless eyelobe. No antennal notch or angle in either sex. Antenna 1 long and slender. Mandible normal. Five pairs of thoracic appendages bearing large flattened exopods in the male, and four in the female. Merus of maxillipeds 2 and 3 expanded, basis of maxilliped 3 not produced distally. Pereiopod 2 7-segmented. Well-developed exopods on first four pereiopods in male, and first three in female. Female with rudimentary exopod on pereiopod 4. Five pairs of pleopods in male. Telsonic somite produced between uropods. Type species *Hypocuma serratifrons* Jones, 1973 from 1 934 m off the Canary Islands.

Hypocuma dentatum sp. nov.

Figs 7 (♂), 8 (♀)

Records

SAM A10602a, *Pieter Faure* 17440: 34°25′S/17°50′E about 400 m
1 subadult ♂ 5,9 mm—uropods missing. HOLOTYPE
1 adult ♂ 6,0 mm—last somite missing
2 adult ♀—cephalothorax only

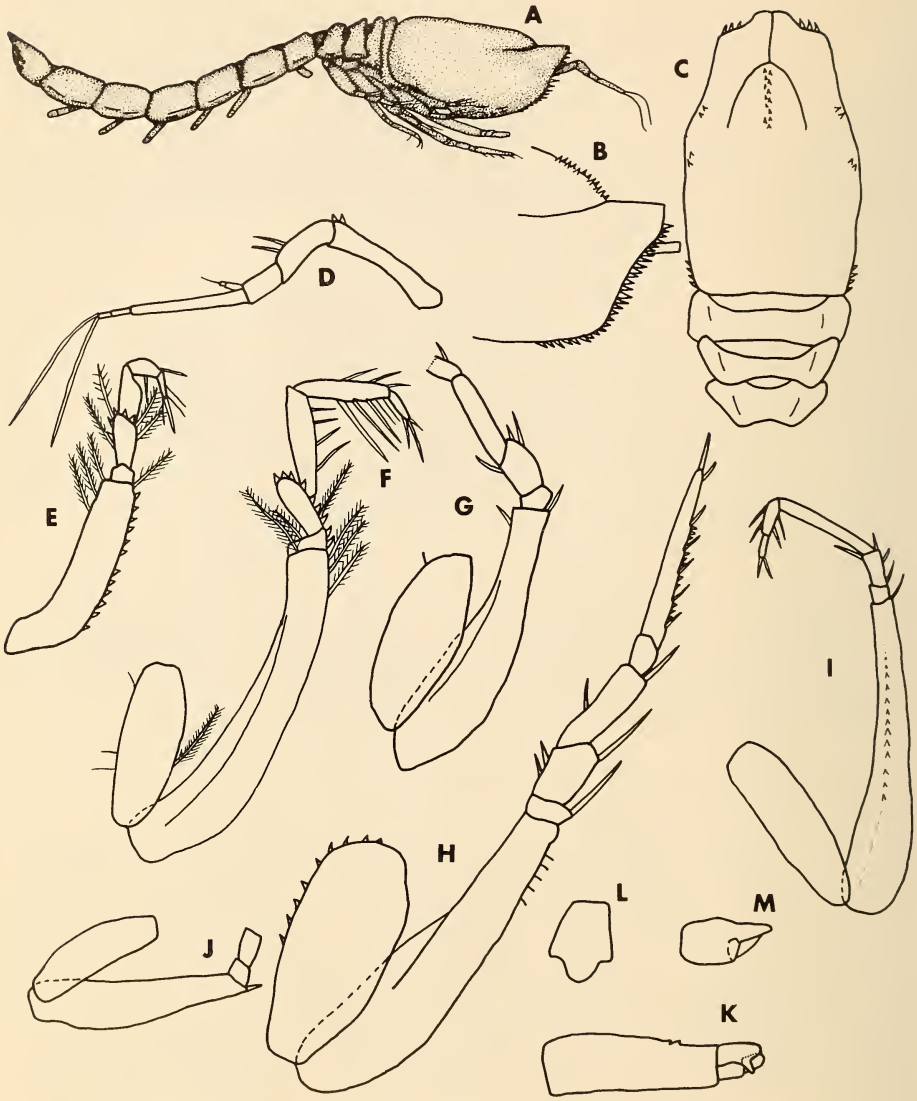

Fig. 7. *Hypocuma dentatum* sp. nov.
Adult male, holotype, 5,9 mm: A, lateral view; B, detail of anterior end of carapace; C, dorsal view of carapace; D, antenna 1; E, maxilliped 2; F, maxilliped 3; G, pereiopod 1; H, pereiopod 2; I, pereiopod 3; J, pereiopod 4; K, pleopod 2; L, dorsal view of telsonic somite; M, lateral view of telsonic somite.

Holotype

Subadult male, deposited in the South African Museum, number SAM A13434.

Description

Subadult male, holotype, length 5,9 mm. Carapace twice as long as deep with slightly upturned pseudorostrum reaching well beyond eyelobe and constituting $\frac{1}{5}$ total length of carapace (Fig. 7A). No antennal notch (Fig. 7B). A row of well-developed denticles on anterior edges of carapace, becoming smaller and disappearing along ventral edge. Eyelobe eyeless with a row of small denticles dorsally (Fig. 7C). Exoskeleton generally sculptured with triangular denticles of varying size. Carapace $1\frac{1}{2}$ times length of free thoracic somites, and of almost equal length to first four abdominal somites. First pedigerous somite visible dorsally and laterally, second to fourth with slight ventro-lateral flanging. Abdominal somites with well-developed sideplates. Telsonic somite produced between uropods for about $\frac{1}{3}$ its length.

Antenna 1 (Fig. 7D) slender, elongate, and geniculate between first and second segments. Flagellum 3-segmented, with first segment greatly elongated. Accessory flagellum small, 2-segmented.

Maxilliped 2 (Fig. 7E) with a row of denticles on inner edge of basis; ischium small; merus and carpus subequal, inner edge of merus expanded distally, and bearing five denticles.

Maxilliped 3 (Fig. 7F) with basis slightly longer than combined length of remaining segments, and not produced distally. Ischium twice as wide as long, with two denticles on inner edge. Merus expanded externally with seven denticles along inner and distal edges. Carpus and propodus subequal, and each $1\frac{1}{2}$ times length of merus. Dactyl small. Basal segment of exopod oval, and less than half length of basis.

Pereiopod 1 (Fig. 7G) relatively short. Ischium as broad as long, and slightly expanded internally, as is the merus. Merus twice length of ischium. Carpus cylindrical, twice length of merus. Dactyl and part of propodus missing. Exopod very well developed, basal segment $\frac{2}{3}$ length of basis.

Pereiopod 2 (Fig. 7H) largest of the legs, nearly $2\frac{1}{2}$ times length of basis of pereiopod 1. Basis slightly keeled to accommodate the large exopod, which has basal segment $\frac{3}{4}$ length of basis, flattened, with a row of 9–10 denticles along the outer and distal edges. Ischium half as long as broad. Merus three times length of ischium. Carpus cylindrical, equal in length to ischium plus merus. Propodus small, just more than $\frac{1}{3}$ length of carpus. Dactyl elongate, equal in length to ischium, merus and carpus together, with a small terminal spine and five lateral spines on inner edge, interspersed with small denticles.

Pereiopod 3 (Fig. 7I) smaller, reaching end of carpus of pereiopod 2. Basal segment of exopod smaller and less expanded, slightly more than half length of basis. Basis long and straight, $1\frac{1}{2}$ times length of rest of limb, with a row of denticles along its length. Ischium square, merus twice its length. Carpus

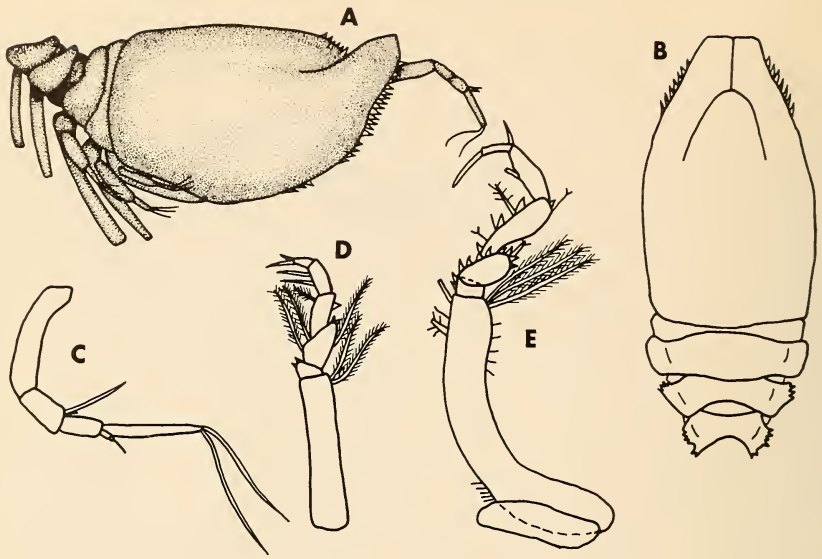

Fig. 8. *Hypocuma dentatum* sp. nov.
Adult female, paratype, carapace length 2,0 mm: A, lateral view of cephalothorax; B, dorsal view of cephalothorax; C, antenna 1; D, maxilliped 2; E, maxilliped 3.

elongate, twice length of ischium plus merus. Propodus and dactyl small, subequal.

Pereiopod 4 (Fig. 7J) smaller still, with basal segment of exopod $\frac{2}{3}$ length of basis. Ischium square, merus slightly longer. Rest of limb missing. Pereiopod 5 missing.

Five pairs of pleopods (Fig. 7K), each with a sharp external projection on inner ramus.

Telsonic somite (Figs 7L, 7M) produced between insertion of uropods for $\frac{1}{3}$ its length, unarmed. Uropods missing.

Adult female, paratype, length of carapace 2,0 mm. Last thoracic segment and abdomen missing in both specimens. Only bases of pereiopods retained.

Carapace similar to male, but deeper, about $1\frac{1}{2}$ times as long as deep (Fig. 8A), with denticles on anterior edge. Pseudorostrum just less than a quarter length of carapace, and more upturned than in male. No eye (Fig. 8B).

Antenna 1 (Fig. 8C) less elongate. First segment longest, second and third subequal and together about $\frac{3}{4}$ length of first. Accessory flagellum with minute second segment. Flagellum 1-segmented, and nearly as long as basal segment.

Maxilliped 2 (Fig. 8D) with merus more expanded internally than in male.

Maxilliped 3 (Fig. 8E) with exopod $\frac{2}{5}$ length of basis. Merus expanded internally, but not as elongated as in male.

Pereiopods represented by bases only, that of pereiopod 2 largest. Articulation of exopod of pereiopod 3 visible, but exopod missing.

Remarks

H. dentatum quite obviously belongs to the genus *Hypocuma*, and the differences between it and *H. serratifrons* are not great. The two species may be distinguished as follows: in *H. dentatum* the exoskeleton is covered by scattered denticles of varying size, those on the anterior edge of the carapace being particularly distinctive, and larger than in *H. serratifrons*. The general shape of the carapace differs, mainly in the lack of a depression behind the pseudorostrum in *H. dentatum* and the nature and degree of tilting of the pseudorostral lobes. The telsonic somite protrudes between the uropods for less than $\frac{1}{3}$ its length in *H. dentatum*, and for nearly half in *H. serratifrons*. The flagellum of the first antenna in *H. serratifrons* is 2-segmented in both the male and the female, and in *H. dentatum* is apparently 1-segmented in the female, and 3-segmented in the male, but since the specimens of *H. dentatum* are very old and quite decalcified, it is difficult to be certain about the exact position of some sutures.

Distribution of Hypocuma

The single sample of *H. dentatum* was obtained from about 400 m off Cape Point. No substrate data are given. The very considerable development of the exopods of the male thoracic appendages indicates that it is an active swimmer. Further collecting off the south and east coasts of southern Africa is needed to determine the distribution range. *H. serratifrons* Jones is also represented by a single sample, from 1 934 m off the Canary Islands.

Vaunthompsonia Bate, 1858

Generic diagnosis

Pseudorostrum short, eyes present. All pedigerous somites visible from above. Telsonic somite slightly produced between uropods. Antenna 1 short with 1-segmented accessory flagellum. Basis of maxilliped 3 not produced distally. Exopods present on pereiopods 1–4 in male and 1–3 in female. Male with five pairs of pleopods. Endopod of uropod 2-segmented.
Type species *Vaunthompsonia cristata* (Bate, 1856), British Isles, Mediterranean, West Indies, Indo-Pacific, South Africa.

KEY TO THE SPECIES OF *VAUNTHOMPSONIA*

1 Peduncle of uropods longer than telsonic somite 2
– Peduncle of uropods shorter than or equal to telsonic somite 3

2 Pereiopod 1 reaching end of carapace with part of propodus; dorsal outline not strongly arched ..... *V. cristata* (Bate, 1856)—widespread
– Pereiopod 1 reaching end of carapace with dactyl only; dorsal outline strongly arched .... *V. arabica* Calman, 1907—India

3 Antero-lateral borders of carapace serrated 4
– Antero-lateral borders of carapace not serrated 6

4 Minute serrations on antero-lateral border only ..... *V.* sp.—South Africa
– Serrations present on carapace apart from antero-lateral border 5

5 Single row of mid-dorsal serrations on carapace..... *V. serratifrons* Gamô, 1964—Japan
– A double row of serrations on posterior half of carapace, converging towards posterior border ..... *V. meridionalis* G. O. Sars, 1887—Antarctica

6 Basis of maxilliped 3 somewhat produced distally... *V. inermis* Zimmer, 1909—Antarctica
– Basis of maxilliped 3 not produced 7
7 Length of telsonic somite anterior to insertion of peduncle greater than length posterior to insertion 8
– Length of telsonic somite anterior to insertion of peduncle shorter than or equal to length posterior to insertion.....9

8 First segment of exopod almost equal in length to second of endopod.....
V. natalensis sp. nov.—South Africa
– First segment of exopod half length of second segment of endopod.....
V. media Zimmer, 1952—Indochina

9 Pereiopod 1 with basal segment of exopod $\frac{2}{3}$ length of basis; first two segments of antenna 1 longer than rest of appendage.....10
– Pereiopod 1 with basal segment of exopod $\frac{2}{5}$ length of basis; first two segments of antenna 1 shorter than rest of appendage..... *V. dawydoffi* Zimmer, 1952—Indochina

10 First segment of exopod of uropod $\frac{1}{6}$ length of second.....
V. floridana Băcescu, 1971—Caribbean
– First segment of exopod of uropod $\frac{1}{2}$ length of second .....
V. nana Hale, 1944—Australia

Vaunthompsonia cristata (Bate, 1856)

Vaunthompsonia cristata: G. O. Sars, 1879: 22, pl. 23–26, figs 17–18. Stebbing, 1913: 10, figs 5–7.

Records

One specimen from False Bay (34°S/18°E), depth 5 m

Holotype

Designated by Bate, 1856, from western France. ?British Museum (Natural History).

Remarks

This species, represented by a single damaged male, was identified by Jones (1960) from UCT material taken from False Bay. Dr Jones has kindly re-examined the material, which is still in his possession, and confirms his original identification.

Distribution

Widespread—British Isles, Mediterranean, Annam, Japan, West Indies, South Africa, in shallow waters.

Vaunthompsonia natalensis sp. nov.

Figs 9 (♀), 10 (♂)

Records

SCD 272 Y	19.7.1961	34°23′S/25°54′E	Sand and shell	182 m	1 ♀ ovig.	3,4 mm
SCD 321 L	9.7.1962	34°15′S/25°50′E	Fine sand	108 m	1 subadult ♂	3,0 mm
Coast 4/P3	6.2.1973	30°37′S/30°40′E		75 m	1 ♀	2,0 mm
Coast 4/Q2	6.2.1973	30°46′S/30°31′E		48 m	1 ♀	1,8 mm

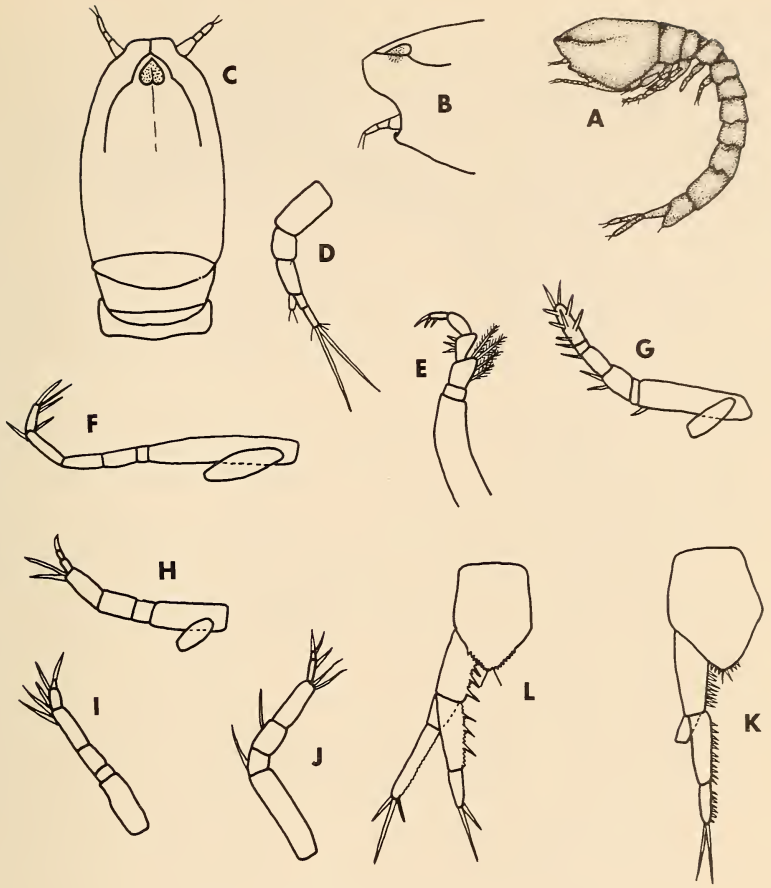

Fig. 9. *Vaunthompsonia natalensis* sp. nov.
Adult female, holotype, 3,4 mm: A, lateral view; B, detail of anterior end of carapace; C, dorsal view of carapace; D, antenna 1; E, maxilliped 3; F, pereiopod 1; G, pereiopod 2; H, pereiopod 3; I, pereiopod 4; J, pereiopod 5; K, telsonic somite and uropod of adult; L, telsonic somite and uropod of juvenile.

Holotype

Ovigerous female deposited in the South African Museum, number SAM A13435.

Description

Ovigerous female, holotype, length 3,4 mm. Body compact, smooth, without serrations (Fig. 9A). Carapace about $\frac{2}{3}$ as deep as long, somewhat vaulted anteriorly with faint mid-dorsal carina on eyelobe. Antennal notch shallow, antero-lateral angle defined by a small tooth (Fig. 9B). Eye obvious, heart-shaped in dorsal view, with no visible lenses (Fig. 9C). Pseudorostrum meeting in front of the rounded eyelobe for a short distance. Carapace a quarter

as long again as free thoracic somites, all of which are visible dorsally. Cephalothorax as long as abdomen excluding uropods. Abdominal somites cylindrical, each with a small posterior articulatory process. Telsonic somite produced between uropods for half its length, with several fine spines between uropods, and two fine anal setae (minutely serrated between uropods in juveniles).

Antenna 1 (Fig. 9D) with basal segment longest, and second segment shortest. Flagellum 2-segmented with two terminal setae. Accessory flagellum 1-segmented.

Basal segment of maxilliped 3 (Fig. 9E) not produced. Ischium twice as broad as long. Merus somewhat expanded distally, and slightly longer than broad. Carpus widened distally, subequal to merus. Propodus and dactyl nearly subequal.

Pereiopod 1 (Fig. 9F) fairly elongate, with dactyl and part of propodus extending beyond carapace anteriorly. Basis equal in length to next four segments. Ischium small, square. Next four segments almost subequal. Basal segment of exopod half length of basis.

Pereiopod 2 (Fig. 9G) relatively stout, 7-segmented. Ischium $\frac{1}{3}$ as long as wide, merus and carpus subequal. Propodus $\frac{1}{3}$ length of dactyl, which bears a number of spines. Basal segment of exopod less than half length of basis.

Pereiopods 3–5 (Figs 9H–J) similar, except for exopod of pereiopod 3. Basis of pereiopod 5 longest.

Peduncle of uropod stout, shorter than telsonic somite (Fig. 9K) with seven sharp setae on inner edge; juveniles with three spines on minutely serrated inner edge (Fig. 9L). Rami of juveniles subequal. First segment of endopod of adult twice length of second with ten small spines on inner edge; juveniles with three spines on serrated inner edge. Second segment of adult with six small spines on inner edge (juveniles unarmed) and two terminal spines in all three specimens. Exopod of juveniles with first segment $\frac{2}{5}$ length of second, unarmed. Second segment missing in holotype; minutely serrated on inner edge of juveniles, with two short spines and one terminally.

Subadult male length 3,0 mm. Differs from the female as follows: generally more robust; carapace slightly less deep (Fig. 10A). Eye with a ring of 11 lenses around edge of pigmented area (Fig. 10B).

First segment of flagellum of antenna 1 longer than second (Fig. 10C).

Merus of maxilliped 3 (Fig. 10E) slightly longer and broader. Carpus not expanded.

Last five segments of pereiopod 1 missing.

Five pairs of pleopods present (Fig. 10H).

Shape of telsonic somite as in female, but unserrated posteriorly (Fig. 10I). Peduncle of uropod slightly longer, with nine spines on inner edge. First segment of exopod unarmed, half length of second; second bearing four small spines on outer and three on inner edge, and three terminally. First segment of endopod twice length of second, with 12 sharp spines on inner edge; second with five small spines on inner edge, and three terminally.

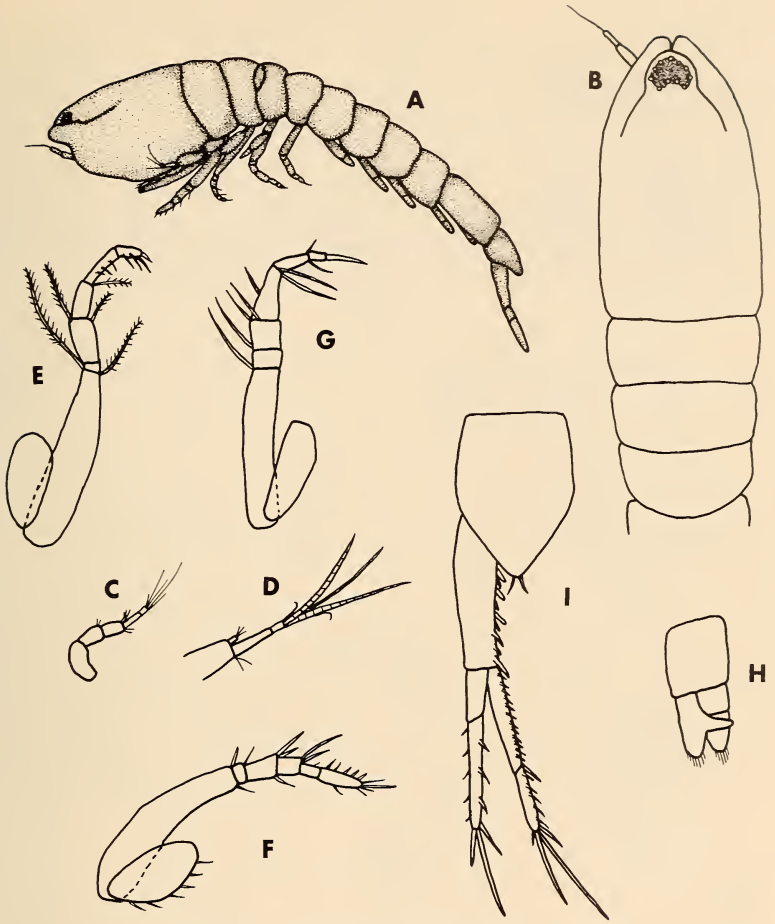

Fig. 10. *Vaunthompsonia natalensis* sp. nov.
Subadult male, 3,0 mm: A, lateral view; B, dorsal view of carapace; C, antenna 1; D, detail of distal end of antenna 1; E, maxilliped 3; F, pereiopod 2; G, pereiopod 4; H, pleopod 3; I, telsonic somite and uropod.

Remarks

This species conforms to the general facies of the genus. It differs from the other unserrated members as follows: the carapace of the female is somewhat deepened midway along its length; the eye is heart-shaped in dorsal view; the merus of maxilliped 3 is slightly broadened distally, particularly in the female. The exopods of the pereiopods are smaller and narrower than those of other species, and the peduncles and rami of the uropods are particularly stout. The proportions of the uropodal segments are distinctive, especially in that the first segment of the exopod and the second of the endopod are subequal.

Distribution

Endemic to Natal from 45 to 182 m.

Fig. 11. *Vaunthompsonia* sp.
Adult female, 4,4 mm: A, lateral view; B, detail of anterior end of carapace; C, dorsal view of carapace; D, detail of anterior end of carapace in dorsal view; E, antenna 1; F, maxilliped 3; G, pereiopod 1; H, pereiopod 2; I, pereiopod 3; J, pereiopod 4; K, pereiopod 5; L, telsonic somite and uropod.

Vaunthompsonia sp.
Fig. 11

Records

WCD 95 V	3.7.1961	33°06′S/17°49′E	88 m	Mud and rock	1 ♀	4,4 mm

Description

Adult female, length 4,4 mm. In most respects (Figs 11A–D, F, H–K) similar to *V. media* Zimmer, 1952, from Annam, but differs in the length of the basal segment of antenna 1 (Fig. 11E), in the relative lengths of the merus and

carpus of pereiopod 1 (Fig. 11G) and the telsonic somite and uropods (Fig. 11L), described below.

Telsonic somite $\frac{3}{4}$ as wide as long at its widest point, and produced between uropods for half its length, terminating in two small anal setae. Ratio of outer edge of telsonic somite: outer edge of peduncle is 1 : 2. Peduncle with nine spines on inner edge. First segment of endopod slightly more than half length of peduncle, with 12 fine spinules along inner edge. Second segment missing. First segment of exopod $\frac{3}{4}$ as long as first segment of endopod, unarmed. Second segment just shorter than first, with four small spines near the end.

Remarks

Since neither of the uropods of the single female is complete, and since Zimmer described *V. media* on the basis of adult males, certain identification or the erection of a new species should await further material. The specimen differs from *V. natalensis* in the shape of the carapace, in the basis and carpus of maxilliped 3, in the presence of serrations on the lower border of the carapace and in particular in the proportions of the telsonic somite, and the peduncle and rami of the uropods.

Distribution of Vaunthompsonia

Vaunthompsonia has the widest distribution of any of the genera under consideration. Species occur from the British Isles (*V. cristata*) to South Georgia and Kerguelen (*V. meridionalis* and *V. inermis*), Japan (*V. serratifrons*) and Australia (*V. nana*). The genus is generally confined to waters shallower than 250 m, but *V. meridionalis* has been found at 315 m in South Georgia.

Bathycuma Hansen, 1895

Generic diagnosis

Pseudorostral lobes meeting anteriorly. Eye absent. First pedigerous somite exposed. Telsonic somite produced between uropods. Basis of maxilliped 3 produced distally. Exopods present on pereiopods 1–4 in male, and 1–3 in female. Male with five pairs of pleopods. Endopod of uropod 2-segmented.
Type species *B. elongatum* Hansen, 1895, from 4 980 m in the central Atlantic.

KEY TO THE SPECIES OF *BATHYCUMA*

1 Lateral carinae on pleon somites.....2
– Pleon somites not carinate.....3

2 Distal prolongation of basis of maxilliped 3 not reaching end of merus.....
B. longicaudatum Calman, 1912—California
– Distal prolongation of basis of maxilliped 3 reaching beyond end of merus.....
B. magnum Jones, 1969—Indian Ocean

3 Pereiopod 2 with six segments.....*B. elongatum* Hansen, 1895—Atlantic
– Pereiopod 2 with seven segments.....4

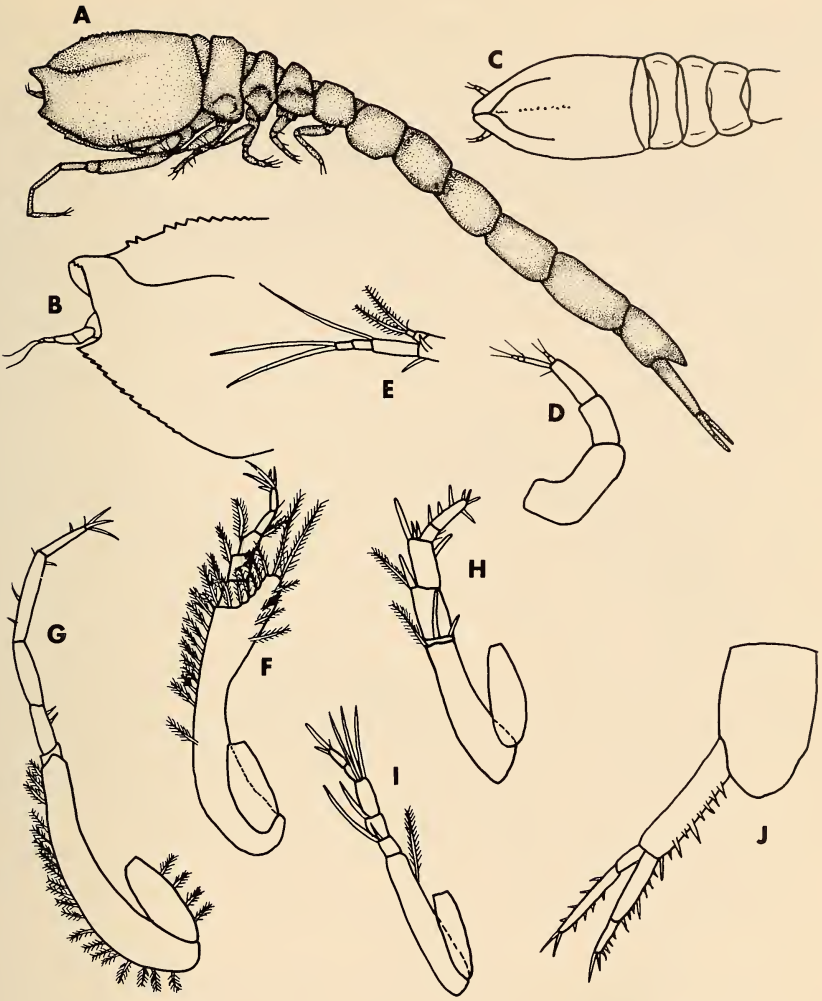

Fig. 12. *Bathycuma capense* (Zimmer, 1921)
Adult female, 10,2 mm: A, lateral view; B, detail of anterior end of carapace; C, dorsal view of carapace; D, antenna 1; E, detail of distal end of antenna 1; F, maxilliped 3; G, pereiopod 1; H, pereiopod 2; I, pereiopod 3; J, telsonic somite and uropod.

Antenna 1 (Fig. 12D) robust, first segment geniculate and longer than next two together. Second segment just shorter than third. Flagellum (Fig. 12E) 3-segmented, nearly as long as second basal segment, with two terminal setae. 2-segmented accessory flagellum half as long as first of flagellar segments, with two plumose terminal setae.

Maxilliped 3 (Fig. 12F) setiferous. Basis more than twice length of remaining segments, with a distal prolongation reaching half way along merus. Other seg-

ments subequal, ischium slightly longest and stoutest. Basal segment of exopod more than quarter length of basis.

Pereiopod 1 (Fig. 12G) elongate, with propodus and dactyl exceeding tip of pseudorostrum. Basis setiferous. Ischium broader than long. Carpus equal to ischium plus merus. Propodus and dactyl long and slender. Basal segment of exopod $\frac{2}{5}$ length of basis.

Pereiopod 2 (Fig. 12H) fairly stout, basis nearly as long as last four segments. Ischium distinct but very short. Merus and carpus subequal, stout, each with a strong distal spine. Propodus $\frac{1}{3}$ length of merus. Dactyl relatively short, twice length of propodus, with a few small spines. Basal segment of exopod $\frac{2}{3}$ length of basis.

Pereiopod 3 (Fig. 12I) more slender. Basis longer than remaining segments together, of which carpus is longest. Exopod as in pereiopod 2.

Peduncle of uropods shorter than telsonic somite (Fig. 12J) with nine uneven spines along inner edge. Exopod just longer than endopod and just shorter than peduncle. First segment of exopod less than half length of second, unarmed. Second segment with four small spines on both edges, and two terminally. First segment of endopod more than twice length of second, with seven small spines on inner edge. Second segment with four spines on inner edge and two terminally.

Subadult male, length 10,2 mm. As in female, except: carapace more rectangular in outline; pseudorostral lobes $\frac{1}{7}$ total length of carapace (Fig. 13A). Antennal notch much shallower, angle obtuse with finer teeth below (Fig. 13B). Length of cephalothorax somewhat less than length of next five abdominal somites.

Antenna 1 (Fig. 13C) with first segment not geniculate, accessory flagellum longer, flagellum 2-segmented, terminating in two aesthetascs.

Thoracic appendages as in female, but pereiopod 1 longer, with carpus exceeding tip of pseudorostrum.

Armature of uropods more extensive (Fig. 13D).

Remarks

Zimmer (1921) described *B. capense* as *Vaunthompsonia capensis* from a single subadult male, figuring only the entire animal and a uropod. Although he did not accept the genus *Bathycuma*, considering it at most to be a subgenus of *Vaunthompsonia*, it is quite obvious that Zimmer's specimen belongs to *Bathycuma* as now accepted. I am unable to find any significant differences between Zimmer's description and the present material.

Bathycuma natalense Stebbing, 1912
Figs 13E–J (♂), 14 (♀)

Bathycuma natalense Stebbing, 1912: 135, pl. 49.

Records

SST 66 C	21.7.1972	34°23′S/21°26′E	15 m	Sand and shell	1 ♀ adult	9,0 mm
					1 ♀	6,5 mm
					1 ♂	6,1 mm

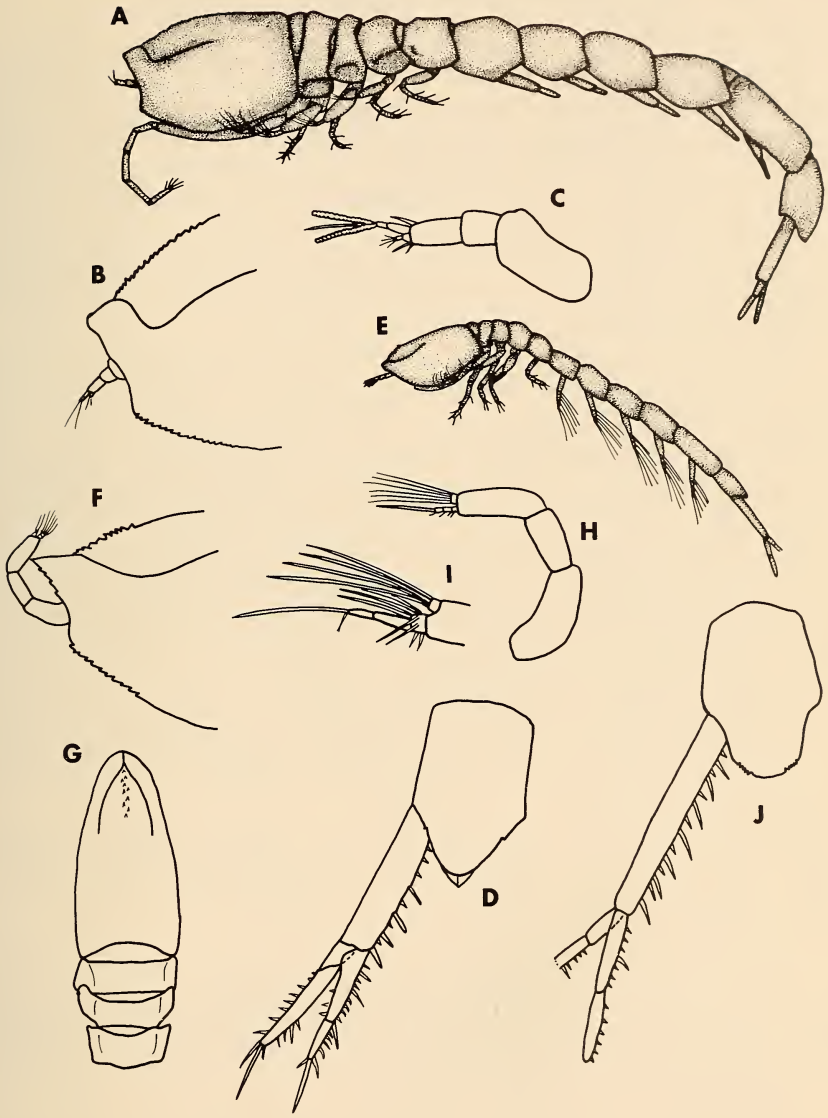

Fig. 13. *Bathycuma capense* (Zimmer, 1921)
Subadult male, 10,2 mm: A, lateral view; B, anterior end of carapace; C, antenna 1; D, telsonic somite and uropod.
Bathycuma natalense Stebbing, 1912
Adult male, 11,2 mm: E, lateral view; F, detail of anterior end of carapace; G, dorsal view of carapace; H, antenna 1; I, detail of distal segments of antenna 1; J, telsonic somite and uropod.

Holotype designated by Stebbing (1912): *Pieter Faure* 12605, 30°10′S/31°03′E 410 m, 2 adult males. British Museum (Natural History).

Description

Adult female, length 9,0 mm. Carapace elongate, less than twice as long as broad, serrated mid-dorsally along eyelobe (Fig. 14A). Pseudorostrum relatively long, meeting in front of small triangular eyelobe for $\frac{1}{6}$ of total length of carapace (Fig. 14E). Antennal notch (Fig. 14B) semicircular, fairly small but well-defined by a large antero-lateral tooth with a few serrations running along ventro-lateral border. Carapace longer than free thoracic somites which are slightly flanged laterally. Cephalothorax just longer than next five abdominal somites, which are cylindrical in cross-section and lack carinae. Telsonic somite produced between uropods for nearly $\frac{1}{3}$ its length.

Antenna 1 (Fig. 14C) fairly long and slender. Basal segment geniculate, next two subequal, each $\frac{2}{3}$ length of basal segment. Flagellum (Fig. 14D) 2-segmented, first twice length of second, which bears two aesthetascs. Accessory flagellum 2-segmented and $\frac{2}{3}$ length of first flagellar segment.

Maxilliped 3 (Figs 14F and 14G) with basis three times length of remaining segments. Distal prolongation almost reaching end of merus, with four small denticles on inner edge just below insertion of ischium. Ischium just longer than wide with single denticle on inner distal edge. Merus slightly longer than ischium, somewhat expanded externally with two denticles at apex of expansion. Carpus and merus subequal, propodus and dactyl subequal, shorter than carpus. Basal segment of exopod less than $\frac{1}{3}$ length of basis.

Basis of pereiopod 1 (Fig. 14H) long and slender. Ischium short with a single spine on slightly expanded inner edge. Merus twice length of ischium. Carpus and rest of limb missing in this and all other specimens. Basal segment of exopod $\frac{1}{3}$ length of basis.

Basis of pereiopod 2 (Fig. 14I) equal in length to last four segments. Ischium as long as broad, merus $2\frac{1}{2}$ times length of ischium. Carpus equal to ischium plus merus. Dactyl fairly stout and equal in length to carpus. Basal segment of exopod more than half length of basis.

Basis of pereiopod 3 (Fig. 14J) longer than rest of leg. Ischium slightly broader than long, merus $1\frac{1}{2}$ times length of ischium. Carpus longer than ischium and merus together, and twice length of propodus and dactyl together. Basal segment of exopod $\frac{2}{3}$ length of basis.

Pereiopods 4 and 5 without exopods.

Peduncle of uropod longer than telsonic somite (Fig. 14K), with about 13 spines arranged in two rows along inner edge. Exopod $\frac{2}{3}$ length of peduncle, first segment unarmed, half length of second, which has eight small spines on outer and five on inner edge, and three terminally. First segment of endopod slightly longer than first segment of exopod, with four spines on inner edge. Second segment missing.

Adult male, length 11,2 mm. As the male is in poor condition, Stebbing's

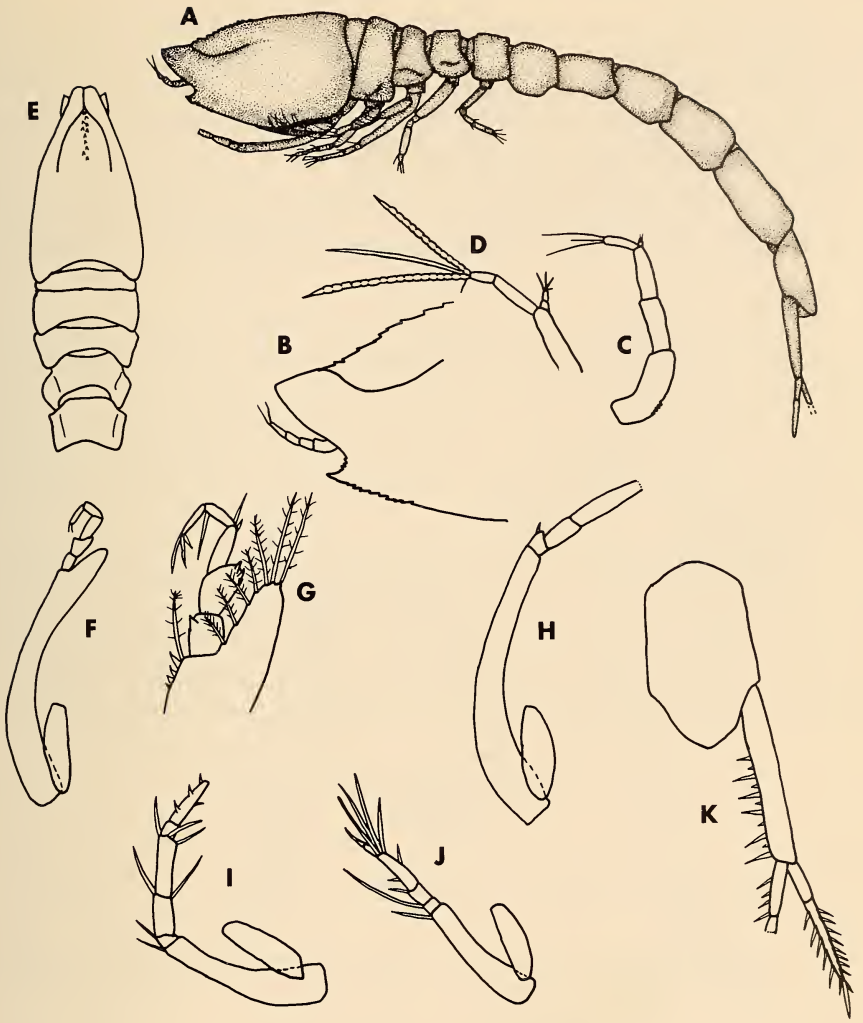

Fig. 14. *Bathycuma natalense* Stebbing, 1912.
Adult female, 9,0 mm: A, lateral view; B, detail of anterior end of carapace; C, antenna 1; D, detail of distal end of antenna 1; E, dorsal view of carapace; F, maxilliped 3; G, distal segments of maxilliped 3; H, pereiopod 1; I, pereiopod 2; J, pereiopod 3; K, telsonic somite and uropod.

type is redescribed where it differs from the female. The whole animal (Figs 13E and G) is refigured, as the type specimens do not correspond well with his original figures.

Carapace as in female, but lacking antennal notch and antero-lateral angle (Fig. 13E). Twice as long as deep, and more vaulted anteriorly with serrations on ventral edge of pseudorostral lobes.

Antenna 1 (Fig. 13H) unusual, extremely robust, with numerous setae on the accessory flagellum (Fig. 13I). Basal segment geniculate. Flagellum 3-segmented, first segment small with a number of setae; second twice length of first, third just longer than first with a single terminal spine. Accessory flagellum 1-segmented with numerous long setae.

Pereiopods as in female.

Telsonic somite (Fig. 13K) with minute serrations laterally, posterior to insertion of uropods. Uropods and first segment of endopod relatively longer.

Remarks

In most respects, this species is similar to other members of the genus, but is distinguished by the greater length of the peduncle of the uropods, and the very robust first antennae of the male. *B. natalense* and *B. capense* are similar to each other in general appearance, and are probably closely related. In addition to the differences in the first antennae of the adult males, however, they are also distinguished by the relative lengths of the uropods and the different shapes of the carapace.

The depth of the type specimen (about 400 m) is fairly typical for the genus, but the shallow depth of 15 m for the SST sample seems inexplicable. Records, logs and labels have been checked and seem to be correct. The greatest depth reached in this particular transect was 200 m, so that even had a labelling error occurred, the depth is surprisingly shallow. Further collecting is required to determine whether in fact *B. natalense* does normally occur at such shallow depths.

Bathycuma datum sp. nov.

Fig. 15

Records

SAM A10602b, *Pieter Faure* 17440: 34°25′S/18°50′E 400 m 1 ♀ 7,7 mm

Holotype

Unique adult female, deposited in the South African Museum, number SAM A13436.

Description

Adult female, length 7,7 mm. Body smooth, integument very finely squamous. Dorsal outline of carapace gently arched, not carinate or serrate (Fig. 15A). Pseudorostrum very short, meeting just in front of minute, triangular eyeless eyelobe (Fig. 15C). Antennal notch relatively deep, antero-lateral angle with a small tooth (Fig. 15B). Carapace $\frac{2}{3}$ as deep as long, and just longer than remaining free thoracic somites. Terga of second, third and fourth pedigerous somites slightly elevated, the second most obviously. Cephalothorax just shorter than abdomen. Telsonic somite only slightly produced between uropods.

Antenna 1 (Fig. 15D) short, basal segment robust, $\frac{3}{4}$ as broad as long with a row of six small denticles along outer edge. Second segment $\frac{1}{3}$ length of first, and broader than long. Third segment nearly twice length of second. Flagellum

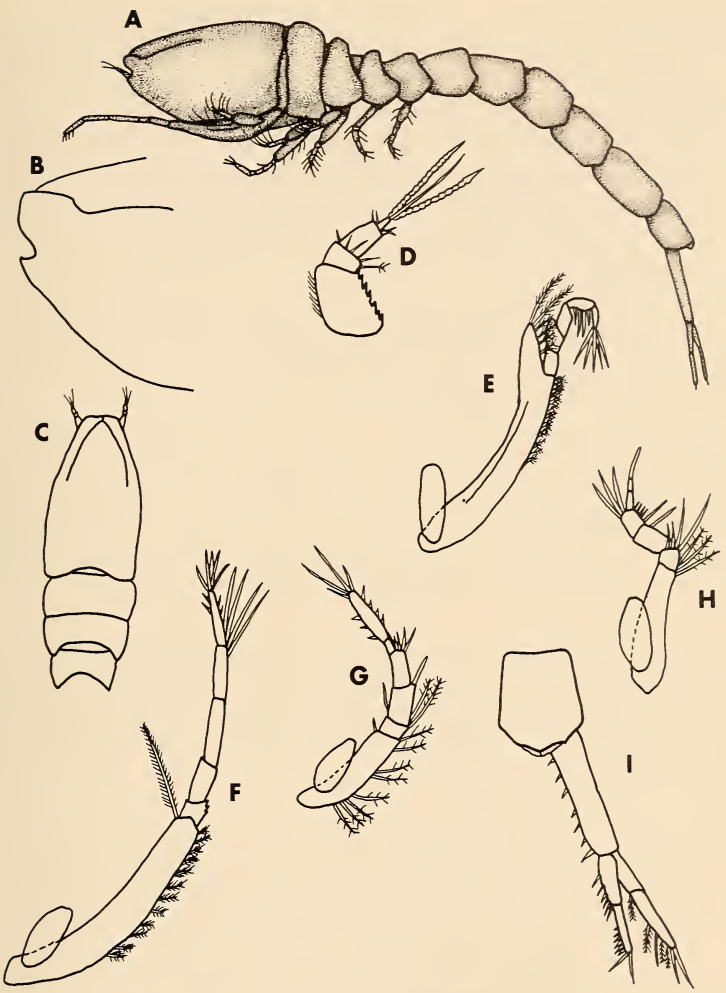

Fig. 15. *Bathycuma datum* sp. nov.
Adult female, holotype, 7,7 mm: A, lateral view; B, detail of anterior end of carapace; C, dorsal view of carapace; D, antenna 1; E, maxilliped 3; F, pereiopod 1; G, pereiopod 2; H, pereiopod 3; I, telsonic somite and uropod.

1-segmented with two terminal aesthetascs. Accessory flagellum 1-segmented, and half as long as flagellum.

Mandible normal, with narrow base.

Basis of maxilliped 3 (Fig. 15E) (including distal prolongation) twice length of remaining segments. Prolongation of basis narrow, extending not quite to distal end of merus. Ischium nearly twice as long as broad, merus slightly longer than ischium, slightly expanded internally. Basal segment of exopod less than $\frac{1}{3}$ length of basis.

Pereiopod 1 (Fig. 15F) elongated, basis just shorter than remaining segments. Ischium square with two small denticles distally. Merus twice length of ischium. Carpus equal to ischium plus merus. Propodus and dactyl subequal. Basal segment of exopod less than $\frac{1}{3}$ length of basis.

Basis of pereiopod 2 (Fig. 15G) just longer than next four segments. Ischium $1\frac{1}{2}$ times as broad as long, merus twice this length. Merus and carpus subequal, propodus small. Dactyl almost as long as merus plus carpus, setiferous, with four very stout terminal spines. Basal segment of exopod more than half length of basis.

Pereiopod 3 (Fig. 15H) with basis longer than remaining segments. Ischium square, merus twice its length. Propodus and dactyl almost subequal, each $\frac{2}{3}$ length of carpus. Basal segment of exopod less than half length of basis.

Pereiopods 4 and 5 similar, but basis of pereiopod 4 longer.

Peduncle of uropods (Fig. 15I) $1\frac{1}{2}$ times length of telsonic somite and just longer than exopod, with seven evenly spaced spines along inner edge. Endopod just shorter than exopod, segments subequal, first with six fine spines on inner edge, second with six small spines on inner edge and two long terminal spines. First segment of exopod $\frac{2}{3}$ length of second, unarmed. Second with four plumose setae and one spine on inner edge, and two spines terminally.

Remarks

This species may be distinguished from others of the genus by the absence of a serrated dorsal carina, the short, stout first antenna with a 1-segmented flagellum, and the relatively short prolongation of the telsonic somite between the uropods.

Distribution of Bathycuma

As the name *Bathycuma* indicates, most of the species in this genus inhabit waters of a considerable depth—usually more than 1 000 m. The genus is quite widely distributed in the North Atlantic, Mediterranean, Indian and Pacific Oceans, generally being circumtropical, with certain elements from higher latitudes. The three South African species would appear to have been derived from the Indian Ocean group, rather than having spread from the North Atlantic, since no species have been found on the west coast of Africa. All three are endemic, *B. capense* to the west coast, *B. natalense* to the south and east coasts, and *B. datum* to the Cape west of the Peninsula. The known depths at which all three species occur are unusually shallow for the genus.

DISTRIBUTION OF THE VAUNTHOMPSONIINAE

In general the distribution of each species in the subfamily is rather narrow. This is partly due to rather scanty collecting in many areas, but even taking this into account, of the 65 species listed in Jones (1969) and the present work, only one, *Vaunthompsonia cristata*, is found in the Atlantic, Indian and Pacific Oceans, one in the Pacific and Indian Oceans (*Heterocuma sarsi*), one in the

Atlantic and Pacific Oceans (*Cumopsis goodsiri*), and one in the Indian and Atlantic Oceans (*Heterocuma africanum*)—a total of less than 7% of the species in the subfamily occurring in more than one ocean.

Zimmer (1941) has called the Bodotriidae a 'negatively amphipolar' family. This is borne out by the fact that none of the Vaunthompsoniinae has been found at latitudes greater than 70°. Table 1 details the distribution of the subfamily. Each species may be represented more than once, as each record of a species from widely differing areas has been included.

TABLE 1

Distribution of Vaunthompsoniinae according to depth and latitude. Data mainly from Jones (1969).

Latitude	*Shore–5 m*	*5–200 m*	*200–2 000 m*	*>2 000 m*	*Total number*
N of 70°N	—	—	—	—	—
70°N–50°N	1	4	—	—	5
50°N–20°N	3	13	5	1	22
20°N–20°S	1	13	3	1	18
20°S–50°S	2	36	4	2	44
50°S–70°S	—	2	—	1	3
S of 70°S	—	—	—	—	—
Total	7 (5 sp)	68 (47 sp)	12 (10 sp)	5 (5 sp)	92 (67 sp)

Only eight of the 92 records are from latitudes greater than 50°. The majority of records are from 20° to 50° N and S, fewer being found in the tropics, which is generally true for the Cumacea. The predominance of records in the south temperate latitudes may be due to the very extensive work done by Hale in Australia. 21 of the 44 records for these latitudes are his, and as few other areas have been as thoroughly worked, the data are somewhat biased in this direction. However the bias is offset to some extent by the fact that only one member of the subfamily has been described from the whole of South America, where very little collecting has been done. Assuming that more records will eventually come from this region, it may be concluded that the Vaunthompsoniinae are a family of temperate latitudes, predominating in the south.

Again, 81% of the records are from depths less than 200 m, indicating that the subfamily belongs predominantly to the shelf fauna, with some elements, particularly members of the genus *Cumopsis*, now occupying the infratidal fringe, and some, particularly *Bathycuma* and *Gaussicuma*, the bathyal and abyssal zones.

DISTRIBUTION OF THE SOUTH AFRICAN VAUNTHOMPSONIINAE

The southern African coast is washed on the western side by the cold northward-flowing Benguela Current (surface 15°C, bottom 10°C), and the warm Moçambique Current flowing southwards along the east coast (surface 25–27°C, bottom 21°C). The southern coast has the fast-flowing warm Agulhas Current running from north-east to south-west (surface 25°C, bottom 12–14°C), and a

narrow counter-current close inshore. The Cape Peninsula marks the westward extent of the warm tongues of Agulhas water which occasionally penetrate into False Bay (surface 15°C, bottom about 12°C). The boundary between Agulhas and Benguela water is not stationary, so that False Bay may also receive cold Benguela water at other times of the year. Thus generally animals from the west coast are cold-water forms, and those from the south and east coasts (including False Bay), warm-water forms. It is frequently found that animals occurring in fairly shallow water on the cold west coast inhabit deeper waters on the south coast due to the increased temperature of the Agulhas water (Day *et al.* 1970). Seven of the eleven species and subspecies of Vaunthompsoniinae in these waters are confined to one or other coast, suggesting that their distribution may be largely temperature-dependent.

The only inter- and infra-tidal species, *Cumopsis robusta*, which belongs to a predominantly intertidal genus, has only been found in False Bay and on the west coast, and is therefore endemic. The anatomically related *Heterocuma* is a shelf genus. *H. africanum intermedium* occurs in fairly large numbers in False Bay (maximum depth just less than 90 m) to a depth of 66 m, and has also been found in 27 m on the west coast. The same species has also been recorded twice from the south coast in 84 to 91 m—an example of shallower depth range on the west coast. It has also been recorded from shallow waters off tropical West Africa. It is thus a warm-water Atlantic form, and is the only species represented by more than 12 specimens in the present collection. *H. africanum africanum* has only been found off Natal in 43 m, as well as in the Indian Ocean and tropical West African waters.

Pseudosympodomma africanum is endemic, being found at a depth of 370 m off the Cape Peninsula, and also at 85 and 135 m off the east coast.

The *Bathycuma/Hypocuma/Vaunthompsonia* group is divided not only taxonomically but also ecologically, *Bathycuma* generally occurring at very great depths, the two species of *Hypocuma* at 400 and 1 934 m and *Vaunthompsonia* at less than 250 m. *Bathycuma*, represented by three species and 17 specimens, can be divided into a group living in fairly deep water off the Cape (*B. datum* and *B. capense*), and *B. natalense* with the rather peculiar depth distribution from 15 to 400 m off Natal. The depth range of all three species is rather shallow, since *Bathycuma* is generally a typically bathyal genus. *Hypocuma dentatum*, represented by only four specimens in a single sample, appears to be a deep-water endemic form. Although three species of *Vaunthompsonia* are present, they are represented by only six specimens, so that numerically, members of the genus are only scantily represented in these waters. The three species do not overlap in range, and the distribution of each necessarily appears narrow due to the paucity of specimens. *V. natalensis* has been found only on the south and east coasts, *V. cristata* in False Bay, and *V.* sp. on the west coast.

Thus the fauna can be divided into three groups:

1. Cold-water forms occurring on the west coast only—*Hypocuma dentatum*, *Bathycuma datum* and *Vaunthompsonia* sp.

2. Warm-water forms occurring on the south and east coasts only—*Bathycuma natalense*, *Vaunthompsonia natalensis* and *Heterocuma africanum africanum*.
3. Forms occurring around the coast, or including False Bay in their range—*Pseudosympodomma africanum*, *Bathycuma capense*, *Vaunthompsonia cristata*, *Heterocuma africanum intermedium* and *Cumopsis robusta*.

The present collection contains at least two thousand specimens of the Bodotriidae. All but 77 of these are Bodotriinae, representing an estimated 18–20 species, giving a specimen : species ratio of at least 100 : 1. The 77 Vaunthompsoniinae represent 11 species, giving a very high ratio of 7 : 1. Thus the subfamily exhibits a very high diversity in these waters. There is also a high rate of endemism. Of the ten named species and subspecies, only three—*Vaunthompsonia cristata*, *Heterocuma africanum africanum* and *H. a. intermedium*—are not endemic. Thus 70% of the species are endemic, with a link to the tropical West African fauna in the form of the two subspecies of *H. africanum*, while *V. cristata* is cosmopolitan.

SUMMARY

Nine species of the southern African members of the subfamily Vaunthompsoniinae are described and figured. Of these, *Hypocuma dentatum*, *Cumopsis robusta*, *Bathycuma datum* and *Vaunthompsonia natalensis* are new species. *Heterocuma africanum africanum* and *H. a. intermedium* are newly designated subspecies. The females of *Bathycuma capense*, *B. natalense* and *Pseudosympodomma africanum* are described for the first time, *P. africanum* also being allocated to a different genus. A specimen of *Vaunthompsonia* is briefly described and figured, but not named. It is found that the subfamily is represented in southern Africa by ten species in six genera.

The general distribution of the Vaunthompsoniinae is discussed, and a more detailed account is given of the distribution of its southern African members. It is concluded that this subfamily in southern African waters has a high rate of endemism and a high diversity, but a very low frequency of occurrence.

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